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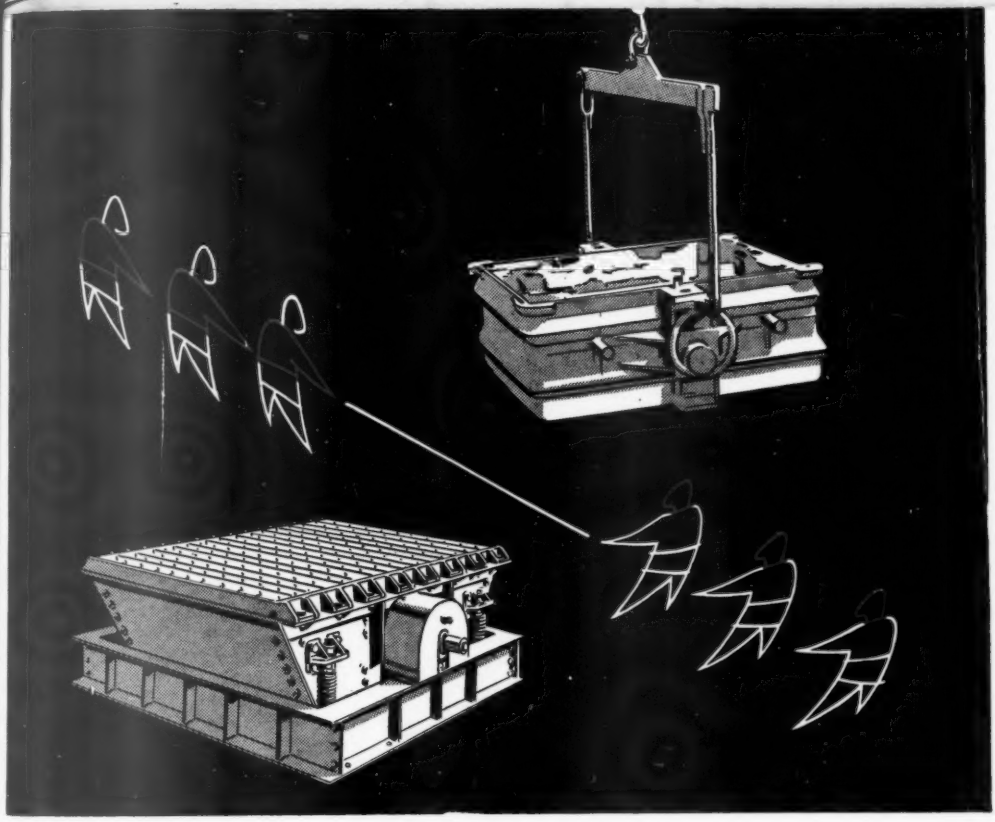

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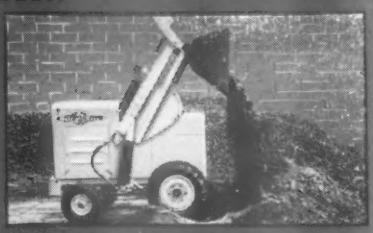

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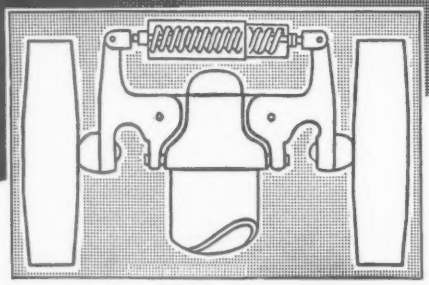

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FOUNDRY
TRADE JOURNAL

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The "Carr" Report

Though the Report entitled "Training for Skill—Recruitment and Training of Young Workers in Industry,"* has been the work of a sub-committee of the National Joint Advisory Council, it is already known as the "Carr" Report. It deals with action to be taken now to ensure that industry may derive the maximum benefit from the greatly increased number of school-leavers in 1962. This will be of the order of 316,000, or 50 per cent. more than in 1956. The employment as apprentices of these adolescents will be facilitated by the abolition of National Service obligations. The Report suggests that this bulge should not create an unemployment problem, providing firms go all out for systematic training of entrants to industry. There are a number of means of carrying out this and for the smaller concerns it involves the use of local technical colleges. In this connection, sensibly, an appeal is made to the larger firms to release appropriate members of the staff to undertake part-time teaching activities.

The Report asks whether apprenticeship is out of date, but we are unable to state exactly what is involved in this matter, as there is no standard. Thus, we quote from page 4 of the Report, "One of the best features of apprenticeship is its capacity for change." A number of UK master patternmakers, during a visit to the Continent, were impressed with the standard of work turned out by a *Centre d'Apprentissage* in Paris. Again, we understand that a German boy who gained the first place in the 1957 International Foundry Apprentice Competition had had a comparatively short training in a similar type of school. Such a system provides an output of journeymen unaffected by customs of the trade or agreements with Trade Unions. The committee does not believe that the control of apprentices by legislation, as is done in certain Australian industries, is appropriate for application to this country. We recall correspondence we have had on the subject of apprentices with a foundry owner in Australia. In a letter to him, we remember emphasizing the need for salesmanship in recruitment of lads and stating that of first importance in this field was being able to point to a satisfied and enthusiastic apprentice. We received the reply that in a certain Australian city there was not a single foundry apprentice. This lends support to the Report's conclusion, which goes further and states "that the application of a uniform ratio to individual firms is unrealistic and wasteful." It is obviously a job for each concern wisely to plan for its own recruitment and the proper training of its own staff. A useful suggestion is that skilled men detailed to instruct apprentices first should be taught how to teach. Of current interest to the foundry industry is the recommendation for any training bodies which may be set up to receive a strong lead from the centre of operations, but active local committees are also important. Finally, it is suggested that for the implementation of the Report, a National Apprenticeship Council should be set up to collect and disseminate information about those aspects of training which are common to more than one industry. This is the only remark with which we disagree; we would be quite content to see such a body operating solely for our own industry, which in itself presents a quite sufficiently wide and involved problem.

* Published by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 2s. 6d. net.

Foundry Trades' Equipment and Supplies Association

Function revived after 31-years' lapse

Last week, in London, the Foundry Trades' Equipment and Supplies Association (FTE&SA) by staging a dinner for members and guests revived a function which has lapsed for 31 years. The first and only previous dinner of the FTE&SA was held in 1926 at the Engineers' Club; it took place during the Association's first year of existence and was presided over by Mr. V. C. Faulkner.

Mr. G. E. Lunt, the president of the Association, referred to these facts when he took the chair at last week's dinner which was held in the Savoy Hotel, London. About 125 participated, those at the high table included Mr. N. P. Newman, J.P. (president Joint Iron Council); Mr. Barrington Hooper, C.B.E.; Mr. G. M. Menzies (chairman, British Steel Founders' Association); Mr. D. C. Paterson; Mr. G. C. Paterson; Mr. J. Blakiston (IBF national president); Mr. C. S. Garland (president, National Union of Manufacturers); Mr. P. B. Higgins (president, Association of Bronze and Brass Founders); Mr. Faulkner; Mr. K. Marshall (director, Joint Iron Council); Mr. A. C. Turner; Mr. A. Talbot (president, IBF London branch); and Mr. C. O. Foster.

After the loyal toast had been proposed by Mr. Lunt, that of "The Association" was proposed by Mr. Newman, who *inter alia* gave his personal impressions of future trading prospects for the ironfounding industry, mentioned the need for real *selling* ability among the industry's salesmen and included comments on the possible working of the Clean Air Act, *vis à vis* founders. One new fact he disclosed was that there is now little hope that the ordinary cold-blast foundry cupola will be scheduled under the Alkali Inspectorate and thus from June 1, these cupolas may come under the supervision of local authorities—from the point of view of dust, fumes and smoke suppression. If this does in fact happen, Mr. Newman advised an early meeting between representatives of local authorities and founders to try to lay down some sort of uniformity of approach and solution to cupola dust, fume and smoke problems. There was no doubt, Mr. Newman continued, that ironfounders would be faced with considerable expense in implementing the requirements of the Act; it would result in increased business for the supply side of the industry and full co-operation between founders and equipment suppliers on such matters he knew could be relied upon.

Replying to this toast, Mr. Lunt referred first to the history of the Association, stressing that of the few founder members present that evening, he was specially pleased to see Mr. Faulkner, who had done so much to serve the Association throughout the whole period of its existence. Of the activities of the FTE&SA, Mr. Lunt was at pains to point out that never had price-fixing of any sort entered into its business; first and foremost it had been and was still to-day, concerned with an exhibition policy for members, which was working out very well. During the war, various forms of controls, principally as regards the allocation of raw materials, were operated at the request of Government Departments, but it has been in the years since 1945 that the Association has diversified its activities, grown from strength to strength and become more representative of the foundry-equipment manufacturers and suppliers in this country. Mr. Lunt quoted membership figures and said that in 1945 the membership was 40 and to-day, the Association had 81 member companies and these included many of the leading companies in the equipment and supply industry. In recent years, Mr. Lunt continued, the Association had co-operated with Government Departments and other associations on committees dealing with dust and fume problems, portable mould-drying stoves, standardization of moulding boxes, metallic abrasives, ladles and patterns. One particular activity had been the publication of a handbook at regular intervals and which was a useful source of information to foundrymen as well as a Buyer's Guide, particularly for distribution overseas. Mr. Lunt said he would like to mention how indebted the Association was to the members of the small committee who had given so freely of their time in the preparation of the handbook. Concluding his remarks, Mr. Lunt thanked Mr. Newman for the way in which he had proposed the toast and said how pleased he was that Mr. Newman was able to be present.

The toast of the "Guests" was proposed by Mr. Barrington Hooper who, as usual on such occasions, intermingled amusing anecdotes with words of wisdom. He endorsed and elaborated Mr. Newman's point about the need for better selling ability on the part of the foundry and its supplying industries, and then handed over to Mr. Menzies who responded to the toast. Mr. Menzies hails from north of the Border and, not unexpectedly, his remarks mingled the "canny" attitude to business of the Scots with mention of their national beverage, in humorous vein. Mr. Menzies referred to the International Foundry Exhibition held in Düsseldorf about 18 months' ago, and said it was interesting to see that, in spite of the multiplicity and ingenuity of the German exhibits and also of the general European exhibits, the comparatively small number of stands where British foundry equipment was being shown were the centre of great interest. Mr. Menzies concluded his remarks by saying that it had been said that the duty of the foundry industry was to see that the right casting was available at the right time and at the right price, and that he was grateful to the Association for their efforts in raising the efficiency of the British foundry industry, just as all present were grateful for the generous hospitality they were enjoying.

All who attended the function would agree that a sincere "thank you" should be given to Mr. Stote, of Peat, Marwick, Mitchell & Company, the Association's secretaries, who had organized the dinner. During the evening the members and guests were entertained by a vocalist trio, "Three in Harmony." If the enthusiasm shown amongst members and guests at last week's function is any guide there is little doubt that in future the Association's dinner will be an annual event.

Advisory Council on Middle East Trade

An Advisory Council on Middle East Trade, has been formed. Mr. John Vaughan-Morgan, Minister of State, Board of Trade, will be chairman and Mr. W. H. McFadzean, of British Insulated Callender's Cables, Limited, has agreed to be vice-chairman and industrial leader of the Council. Other business men who have agreed to serve are:—Mr. R. A. P. Bevan, O.B.E., S. H. Benson, Limited; Mr. W. R. Beswick, Power-Gas Corporation, Limited; the Hon. M. R. Bridgeman, C.B.E., British Petroleum Company, Limited; Mr. G. C. R. Eley, C.B.E., British Bank of the Middle East; Sir Norman Kipping, J.P., Federation of British Industries; Mr. H. G. Nelson, English Electric Company, Limited; Mr. T. A. L. Paton, Sir Alexander Gibb & Partners; Sir Henry Spurrier, Leyland Motors, Limited, and Mr. Frank Taylor, Taylor Woodrow Group.

Oxidation and Reduction Reactions in the Cupola*

By Dr. G. Tarocchi

In this paper, which has been printed in Fonderia Italiana, *the Author deals with some causes and consequences of changes in the composition of gases in transit within the cupola, under a wide range of operating conditions, from those which lead to oxidation to those which are conducive to reduction. Four main changes of materials or operating conditions are considered. The paper makes the point that any such changes in conditions lead to changes in effect on operation which are related, and that there are no marked discontinuities between the effects of a range of such changes. Thus, operation of the cupola is related to that of the usual high-shaft blast furnace, as well as the low-shaft furnace, which has more obvious relation to the cupola. It may be concluded from the study that any further work on the operation of blast furnaces under a range of closely related conditions, might well throw further light on the rôle of coke, as determined by chemical as well as physical properties, and so lead to an improved basis for assessing the possibilities of manufacturing solid metallurgical fuels as alternatives to hard coke.*

Concept of Coke Reactivity

Increasing attention has been paid to the reactivity of solid liquid and gaseous fuels for many years, although no exact or uniform definition has been evolved for the term "reactivity." It has been used in relation to different fields of interest with different meanings. Thus good foundry coke, as exemplified the product of S. Wales, Ruhr and so on, has generally been recognized as unreactive, burning with difficulty and yielding mainly CO_2 on combustion. Other aspects of reactivity have also been considered, especially the rôle of the fuel in the carburation of the iron. For instance, among the earlier investigations the influence of ash content on carburation rate was estimated, the reactivity in this context being inversely proportional to ash content of the coke. Sipp and Tobias (1932) referred to "rate of carburation . . . inversely proportional to ash content and directly proportional to reactivity," this being defined as "reducing power" and implying some relation between the combustion and carburation reactions.

These authors indicated the apparent rise of reactivity associated with falling temperature of reaction in experimental determinations on a number of types of coke, "reactivity" in this context being characterized by the minimum temperature of reaction (analogous to the characterizing of fuel reactivity by ignition point). Without giving specific definitions of reactivity, as indicated by the rate of carburation, it was pointed out that the value falls with increasing ash content: the *effective* value is, however, also dependent on the lines and construction of the cupola actually consuming the coke.

Krupkowski (1938) expressed the reactivity as a function of the ratio of CO to CO_2 contents ($CO:CO_2$) in the gas from the reaction $FeO+CO \rightarrow CO_2+Fe$, which is exothermic, and the endothermic reaction $CO_2+C \rightarrow 2CO$. At the same time, other authors continued to describe reactivity primarily in terms of carburation (Suchanel, 1938) though still without precise definition. But attention was also paid explicitly to "reducing reactivity" as well as "carburation reactivity," the two terms referring respectively to the reduction and melting stages which can be carried out in a shaft furnace such as a cupola. Other methods for the determination and expression of reactivity have since been proposed.

Pourbaix, Gottignies and Berger (1953) gave a definition in terms of a specified experimental method, as follows:—The index of reactivity is the percentage of CO_2 which reacts to give CO at 950 deg. C. when passed through a ½-in. nichrome tube at 24 litres (0.2174 cu. ft.) per hr. over a 1-in. length packed with the coke sized between 0.04 and 0.08 in. The figures can range from 4.7 to 11.9 per cent., though on varying the temperature of the coke the value can rise, up to 55 per cent. for a temperature of 1,040 deg. C. Weisz and Orning (1952) determined a large number of coke reactivities by measurement of the velocity of self-sustained combustion in air and oxygen atmospheres. They also determined relations between volatile-matter content, ash content and the measured velocity indices, also relating these to the dependence of velocity on the physical structure of the coke.

Such experiments emphasize the dependence of coke reactivity on the method of coke manufacture. Coke produced at low temperatures has maximum porosity and surface rugosity, leading to high reactivity. Coking at higher temperatures generally results in a coke with smaller pore diameters, so that a large surface could be exposed to gas, and the coke thus retain its reactivity. The nature of the surface is, however, changed by changing the coking conditions, and the gas reaction may be inhibited. Of the factors which may affect the coarse macro-structure of the coke and the properties of the coke bed in the cupola attention has been drawn to the favourable effect of low bulk density in promoting gas flow and reaction, the effect of coke ratio on combustion, and

* This paper has been translated and the introductory paragraph written by D. W. Gillings, formerly Carbonization Research Department, National Coal Board.

Oxidation and Reduction Reactions in the Cupola

the possibility of coating the coke with lime, which controls fluxing and surface reactivity (Speckhardt, 1938, Thomas, 1923).

Influence of Blast Temperature and Composition

On raising the temperature of the air blast, the $CO:CO_2$ ratio rises: this is an effect which could also proceed from an increase in the reactivity of the coke. Increasing the percentage of oxygen in the air blast tends to give an initial decrease of $CO:CO_2$ (Severi, 1953) followed on further increase of oxygen content in the air blast by a rise in the ratio, the CO content in the combustion gases then rises more than the CO_2. If blast-heating and enrichment are combined, there will be a substantial rise in the peak temperature within the cupola to the region of 1,800 deg. C. This can result in a rise of metal temperature, and an increase in the

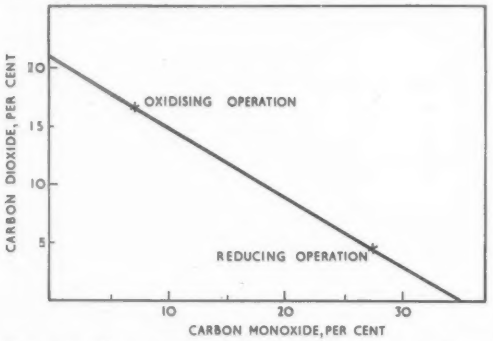

FIG. 1.—*Plot of CO_2 against CO contents, indicating conditions for oxidation and reduction in gases.*

production rate. It is also possible to lower the coke: metal ratio when the blast is pre-heated, but not with enrichment alone.

Measurement of Reactivity

In a review of the laboratory work on this subject, Guerin (1953) pointed out that more than 600 papers have appeared, but inasmuch as the results often appear conflicting, it is difficult to apply the work in practice. However, as a first step to industrial application, a definition of reactivity could be adopted, taking account of existing results, as follows:—The reactivity of solid or other fuel is characterized by the velocity of reaction between the fuel and some other reacting material which may be solid, liquid or gaseous, for standard environment and atmosphere, temperature pressure, choice of reaction and units of measurement must also be standardized.

From the viewpoint of the ironfounder, the relevant reactions are primarily those of oxidation and reduction. Variables which may influence the measurements are: (*a*) condition of materials, including both exterior and interior structure, chemical constitution, hardness and density of the fuel, (*b*) prevailing temperature in the fusion zone, (*c*) effective time of contact of fuel under reacting conditions. It is, moreover, important to distinguish in some way between criteria applicable to thermal and chemical effectiveness of the fuel used in the smelting or melting process. It is not only the melting which is important—the physical properties and chemical composition of cupola iron are also of the greatest significance.

Hitherto, it has almost universally been accepted that the problems associated with technical study of the blast furnace are distinct from those of cupola melting. But there is now a great deal to be said in support of the view (see, for instance, R. Doat, 1953) that it is not correct to distinguish sharply between the two types of operation. The different views can be illustrated by plots based on CO and CO_2 contents in combustion gases, at Figs. 1 and 2. Fig. 1 shows how values of CO and CO_2 correspond for the whole range of completion of combustion from 100 per cent. CO, the extreme of reducing conditions to 100 per cent. CO_2, the least reducing. In Fig. 2, the $CO:CO_2$ ratio is the basis for the combustion index plotted against reaction temperature showing an increase of efficiency on changing from reducing to oxidizing conditions. This expression of efficiency takes account primarily of thermal value of the coke combustion, and the low value indicated (by this or any related index) for the reducing conditions cannot really be accepted as an indication of completely different operation in the extremes of oxidation and reduction. In the cold-blast cupola, fusion occurs essentially in an oxidizing environment, in the blast furnace in a reducing environment, while the hot-blast cupola operates under intermediate conditions. Other work on related lines (F. Kamenesky (1940), K. Sykes (1946), P. C. Wu (1949) and A. F. Reif (1952)) confirms the importance of the overall velocity of the reaction $2CO_2 = O_2 + 2CO$ on which values of oxidizing and reducing reactivities can be based.

An expression of the form in which the velocity can be given bears some relation to the reactivity and combustion indices already mentioned, *viz.*: $\gamma = F(CO_2 : (CO + CO_2))$ where γ is the index of completeness of combustion, expressed as some function F of the ratio given. (See Fig. 3.)

An interim but practical measure of reactivity and reaction condition has been established and applied on cupolas in actual foundry service. This is the automatic recording of the CO_2 and $CO + H_2$ which can be used to determine at any stage in the fusion the probable approximate carbon content in the iron. More extended work by the ironfounders, in collaboration with the laboratories would be most welcome. There is still a need for a specific attack on these lines on the general problem of coke reactivity and the expression of results in a form of the maximum value to the industry. The Author feels that both a challenge and an opportunity are presented by the need for such investigation. In expressing this view, the significance of advances inherent in current work is not overlooked. There has undoubtedly been progress

toward definite results on the lines described, and the use of automatic recording which is practicable for present operation can form a first basis of continuous estimation of conditions under which fuel is used in the cupola, and the fuel characteristics inferred from this.

Methane in the Cupola

By partial oxidation, methane can readily be converted, with satisfactory efficiency and rapidity, and on an adequate industrial scale, to a mixture of carbon monoxide and hydrogen. A particular application of this catalyzed partial oxidation of natural gas is the production of atmospheres of controlled composition which are basically inert-gas mixture with a reducing or carburizing gas content. This mixture can be fed to furnaces for tempering, cementation, hard-soldering or re-melting of metals and metallic products. This is an application which does not necessarily demand any large plant, involves only small gas consumption, and is thus widely used in Italy and other localities with natural gas resources. Hydrogen and carbon monoxide mixtures for reduction of ores can also be produced by this method, which is at present the most important basis for chemical utilization of methane, and is well adapted for metallurgical operation.

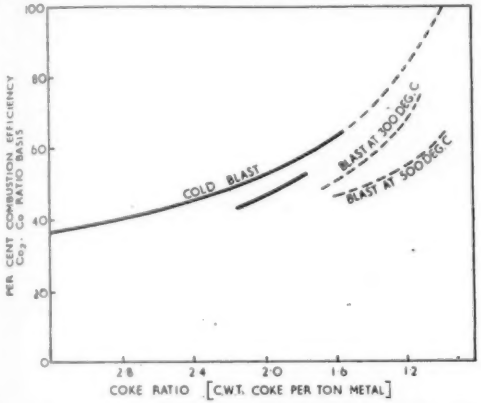

FIG. 2.—*Plot of efficiency index, CO_2 and CO contents and reaction temperature.*

Carburation in the Cupola

One of the conditions most favourable to carburation is high cupola temperature. From this viewpoint it is clear that the hot-blast cupola offers advantages, and extension of its use can be foreseen in the foundry industries of all countries prepared to adopt advanced techniques. Basic, as opposed to acid operation of the cupola also favours carburation, and, as has been observed, there is increased desulphurization as carbon content rises. For example, in iron from a basic cupola with total carbon at about 4 per cent., sulphur may run between 0.01 and 0.02 per cent. If carbon falls to 3 per cent., sulphur rises to 0.05 to 0.07 per cent. Comparison of basic and acid operation must of course be made on as full an economic basis as possible. Increased loss of silicon and high costs of refractories in basic operation must be offset against the benefit of high carbon and low sulphur, and the loss of manganese in acid operation.

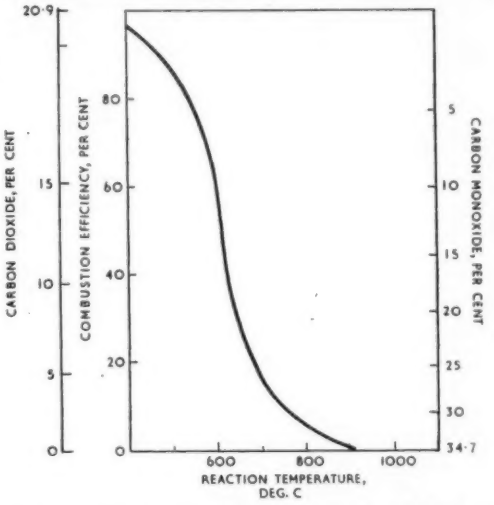

FIG. 3.—*Coke ratio and relation to combustion efficiency.*

Clas (1953) has described a comparative experiment on the production of iron under different operating conditions of the cupola. The contrast between cold- and hot-blast operation is an example of the comparisons. In normal operation, carbon content did not exceed 5 per cent., but on raising the blast temperature to 420 to 440 deg. C. at the tuyeres, total carbon rose to 6 per cent., and there were corresponding changes in the content of other elements. It has been widely recognized that, at the elevated temperatures prevailing in the cupola in hot-blast operation as also in blast-furnace operation, all types of coke tend to show a similar level of reactivity.

Conclusions

As indicated in the diagrams and Author's comments, the following conclusions can be drawn:—

(*a*) A cupola is most readily adapted to operate in conditions favouring either oxidation or reduction, when constructed to operate with hot blast, with appropriate heat-exchange equipment.

(*b*) This alternative operation under oxidizing and reducing conditions is readily achieved: choice of conditions is governed by market conditions and their influence on product specifications.

(*Bibliography included on p.* 234 *at foot of col.* 2)

American Letter

Rolling Stock Orders

Steel foundrymen in the USA who participate in producing castings for railway equipment are facing a 50 per cent. reduction in orders for 1958 as compared to 1957. Deliveries of rolling stock during 1957 were, with the exception of 1948, the largest quantity since 1925. These deliveries of railway equipment were instrumental in sustaining the high tonnage output of steel castings for 1957. The statistics are shown in Table 1.

TABLE 1.—*Rolling-stock Delivered or on Order*, 1955-1958.

—	1955.	1956.	1957.	1958.
Rolling Stock.				
Units delivered ..	37,545	67,080	99,290	—
On order January 1 ..	—	—	117,257	55,941
Ordered during ..	163,033	39,994	42,051	—

Units installed in 1925, 105,735; in 1948, 112,640.

European Automobiles

An interesting aspect of the automobile import position is the fact that Fiats from Italy are now arriving in the USA by the boatload. Also, the first consignment of Citroens arrived representing initial delivery of a 10,000 lot quota for 1958. An increased number of British cars was sold in the USA during 1957. Figures now available reveal that sales rose to over 85,000 units in 1957, against a corresponding figure of 32,305 for 1956.

Tin Consumption and Aluminium Production

Primary tin consumption in the American brass and bronze industry was reduced 25 per cent. in 1957 over 1956. Other industrial uses are sustained so that the total for the year of about 60,000 long tons may remain unchanged over last year.

Primary aluminium smelters have now cut production 20 per cent. This includes a reduction in the huge Canadian output. This production cut is reported to have been made in the face of increased consumption of aluminium in automobile industry. Automobile usage is expected to increase substantially in 1958 in line with progressive increases over the past several years.

Unemployment in the USA

Unemployment in the USA is estimated to have reached a 4,000,000 figure during February out of a labour force of approximately 65,000,000. This is about 6 per cent. of the total and current estimates are that unemployment may reach 7½ per cent. before it becomes stabilized and begins to decrease.

AFS Conferences

The 21st annual conference of the Wisconsin chapter of the American Foundrymen's Society was held on February 13 to 14 at the Hotel Schroeder, Milwaukee. Technical sessions covered malleable, non-ferrous, grey-iron and steel castings and patternmaking. Under the heading of grey iron a paper "Water-cooled Cupola Contraction, Economics, Operation and Problems," by Mr. M. H. Horton, was presented. In the steel session Mr. C. Christopher dealt with "Hot-tears—A Major Casting Defect." The 26th annual South-eastern Foundry Conference was held in Chattanooga on February 20 to 21. It was sponsored by the Birmingham District and University of Alabama chapter of the American Foundrymen's Society, and included ten technical sessions and a number of works visits. Among papers of interest were those devoted to foundry hygiene and safety, CO_2 Practice and coremaking and water-cooled cupola operation.

Electric Melting Exhibition

New ideas in electric melting are to be shown to industry at an exhibition to be held by Birlec, Limited, in conjunction with the London Electricity Board, at the Board's premises in Nelson Street, East Ham, from March 10 to 21 (admission free, by invitation from Birlec* or the Board).

The principal exhibits will include the new Birlec/Morgan electric die-casting crucible furnace, the latest type of Tama tilting furnace and the Ajaxomatic holding and pouring unit for aluminium die-casting, operating under production conditions with a Herbert/Reed/Prentice 1½ G die-casting machine.

The Ajaxomatic has only once been seen operating in public—at last year's Engineering and Marine Exhibition at Olympia. It is designed to eliminate ladling by delivering predetermined quantities of metal directly into the chamber of a die-casting machine, ensuring efficiency of timing and metallurgical control. It is claimed the swift operation of the unit permits the production of aluminium die-castings to reach the same rate as is achieved with zinc-base alloys. It is rated at 20 kw, has an average power consumption of 10-12 kw, with a useful molten metal capacity of 300 lb. The Birlec/Morgan furnace to be shown also has a capacity of 300 lb. It is rated as 25 kw, and is fitted with fully automatic temperature controls, giving constant performance with no quality variation in the metal. An automatic time-switch can be applied to reduce the cost of starting up before normal working hours. The Tama furnace to be displayed is the latest model in the range of low-frequency channel-type furnaces produced by the firm. Also on show will be a scale model of the latest Birlec Detroit rocking-arc electric melting furnace.

* Birlec Limited, Tyburn Road, Erdington, Birmingham.

Increase in Unemployment

Unemployment in Britain in January rose by 60,058 to 395,527—the highest total recorded since March, 1953. The number of unfilled vacancies on January 8 was 220,047, compared with 236,231 on December 4, and 255,542 on January 9 last year. The number of unfilled vacancies last month was the lowest since figures were first published regularly in March, 1947. Expressed as a percentage of the total labour force, unemployment which was 1.5 per cent. last December, rose by only 0.3 per cent. to 1.8 per cent. in January—the same as in January and February, 1957.

Oxidation and Reduction Reactions in the Cupola

(*Continued from p. 233*)

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Pig-iron and Steel Production

Steel production in January averaged 407,100 tons a week, compared with 415,900 tons a week in January, 1957, and shows little or no change in level with that of a year ago. Total home deliveries of steel from UK mills were 3.3 per cent. higher in the fourth quarter of 1957 than in the corresponding period of 1956. Steel exports, state the Iron and Steel Board, continue well above the rate of a year ago, but competition for new orders is much keener. Total supplies of steel to the home market in 1957, including imports by steel-using industries, were, however, 1.4 per cent. less than in 1956, but for the fourth quarter they rose to 3.1 per cent. above those of a year earlier.

Pig-iron production in January was at a rate of 271,000 tons a week, compared with 256,900 tons in January, 1957. This increase in steel-making pig-iron production is resulting in a reduction in imports of scrap and pig-iron. Due largely to reduced requirements for castings for building and ancillary purposes, foundry pig-iron production in the Midlands area is on a lower scale.

Latest pig-iron and steel output figures (in tons), with the corresponding 1956 and 1957 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1957—November ..	281,500	14,639,000	429,200	22,319,000
December ..	275,500	14,329,000	397,900	20,692,000
1958—January ..	271,000	14,090,000	407,100	21,171,000
1956—November ..	262,700	13,660,000	426,400	22,172,000
December ..	262,300	13,637,000	395,900	20,587,000
1957—January ..	256,900	13,361,000	415,900	21,627,000

Production Exhibition 1958

The third Production Exhibition and Conference which is to be opened by the Minister of Power, Lord Mills, K.B.E., at Olympia on May 12, will have as its theme this year "production fights inflation." The main sections of the exhibition will be based on production control, research and development, production in metals, training and careers, services and aids to production and automatic production. The exhibition is sponsored by the Institution of Production Engineers whose president, the Earl of Halsbury, will be president of the exhibition and conference. Proprietor of the exhibition is Andry Montgomery, Limited, substantially the same organization which has organized the Building Exhibitions over the last half-century. The organizers have designed a section to accommodate small and very small firms with a view to encouraging them to exhibit and so to make their contribution to the main purpose of the occasion which is to show how the combined work of research and development can improve the standard of living.

1959 International Foundry Congress

A letter received from Señor Don Augstin Plana, director of the *Instituto del Hierro y del Acero* [the Spanish iron and steel institute], announces the 1959 International Foundry Congress will be held in Spain during the month of October. Meetings will be held both in Madrid and Barcelona. The Congress will take the usual form of technical sessions, works visits, sightseeing, with a special programme for the ladies.

Glasgow Foundryman Honoured

On November 5, 1957, Mr. J. Rutherford, the steel-foundry manager, at the works of William Beardmore & Company, Limited, Parkhead Steel Works, Glasgow, E.1, completed 50 years' service with this firm. At a recent ceremony Mr. P. M. Thomas, managing director, presented him with a money wallet on the company's behalf and expressed the good wishes of all concerned (Fig. 1). Mr. Rutherford follows the tradition of his family as both his grandfather and father similarly had long service, aggregating some 120 years. Mr. Rutherford served his apprenticeship as a patternmaker at Parkhead, and early on in his career graduated to the foundry, interesting himself in the various methods of steel casting manufacture, while acting as the foundry patternmaker, and building up a knowledge which was valuable when the opportunity came to assume responsibility.

FIG. 1.—*Mr. J. Rutherford (left) receiving the presentation from Mr. P. M. Thomas, managing director of William Beardmore & Company, Limited.*

During the last 20 years he has been responsible for the manufacture of many heavy and intricately designed castings. In 1946 the foundry was remodelled to manufacture castings up to 150 tons finished weight, 70 tons having been the previous limit, and many castings weighing over 100 tons are to his credit. He is an active member of the Scottish Steel Founders' Association and is a well-known figure in the trade throughout both England and Scotland.

Basic Materials Prices

Prices of manufacturing industry's basic materials fell again last month when the Board of Trade's index reached its lowest level since March, 1954. At 142, the index dropped two points, or nearly 12 per cent., on a year ago. Manufacturers' prices were again unchanged in January.

The index of industry's output prices has stood at 141.6 since October, representing only a slight rise over the early months of 1957, and indicating that from last autumn, manufacturers' prices have been more stable than in any period since early 1954.

Equipment & Supplies

Oil-fired Crucible Furnace

An oil-fired crucible furnace has been introduced by Norris Equipment & Construction, Limited, 58, Queen's Road, Bristol, 8. The unit is completely self-contained and requires no installation work other than coupling to electric power and fuel-oil supplies. The standard unit comprises a refractory firebrick-lined furnace complete with oil burner, motor-driven secondary air fan with starter mounted on a supporting framework, 8 ft. of flexible air hose to connect the fan and burner, 8 ft. of oil pipe, and a 2 gal. constant level tank fitted with ball valve and stop tap. The furnace has a copper-melting capacity of 150-200 lb. and will melt a charge of 150 lb. of gunmetal from cold in 50 min., the second heat melting time for the same charge being 25 min. With a 200 lb. charge the melting times are 60 min. and 30 min. respectively. Oil consumption is 3.5 gal. per hr.

The furnace casing is cast in one piece with walls ⅜ in. thick and is lined with pre-cast sectional refractory firebricks designed to ensure that re-lining can be carried out by relatively unskilled labour. The lid is very conveniently carried on four rollers and is so designed that it will pivot to expose its underside so that repairs of the firebrick lining can be quickly carried out. "C" shape crucibles should be used in conjunction with the furnace.

The furnace is of the low air pressure type and is designed to be easily dismantled without disturbing any pipe joints. By unscrewing the withdrawal nut the whole inner assembly is forced out, leaving the body in position with the oil and air pipes still attached to it. There are no moving parts in the oil burner to wear or get out of adjustment, so that maintenance work is kept at the minimum. If required, remote controls can be fitted to the burner.

KODAK, LIMITED, of Kingsway, London, have introduced their new "Industrex" illuminator model 2, with overall illumination and improved masking, which has been designed primarily for the examination of industrial radiographs with a wide range of densities. The light source consists of six 15-W. "colour matching" fluorescent tubes, which provide an illumination over the whole area of the screen. This light is sufficiently bright to allow examination of radiographs with densities over 3.5 by full room illumination. Absence of heat enables the illuminator to be "angled" or let into a bench if required.

A feature of the illuminator is the masking device which cuts out unwanted light from the viewing screen and operates from 14 by 17 in. down to approximately 2 in. × 2 in. The unit can be used on 50-cycle A.C. supplies only, within the range of 200-250 V. Illuminators for use on 110-V. A.C. circuits can be supplied to special order.

THE INTRODUCTION of an American design of cupola-lining and patching gun known as the Blastcrete gun to Europe, Asia, and Latin America has been announced by Shallway International Corporation of 25, Black Dog Walk, Crawley, Sussex. This is a portable machine available for either continuous or batch-type operation, operating completely from compressed air. With it the average cupola patching time is quoted as 15 min. Even for areas above the melting zone, it is claimed that refractory materials are now available to take the abrasive effect of the charge. These refractories are applied by the gun once or twice a year, with occasional touching-up in the interim.

BALDWIN INSTRUMENT COMPANY, LIMITED, of Dartford, Kent, have introduced a solenoid valve with manual control, the mechanism of which permits a valve to be manually-operated by pushing a large knob with the palm of the hand. The operation is by means of a shaft which enters through the end cover of the valve and makes contact with the pilot piston head which in turn is connected to the spool. When the over-ride shaft is depressed, it moves the spool from the "normal" to the "operated" position. In addition to being used on solenoid valves, the mechanism can also be employed on pilot-operated valves.

LANSING BAGNALL, LIMITED, of Basingstoke, have placed on the market a new battery electric tractor (model TOER) which has been built on the same chassis as the previous diesel-engined model. It is also similar to the latter in that it incorporates independent four-wheel suspension features for work over uneven ground. The new tractor carries a 12-cell (24 volt) lead acid battery of 627 amp. per hr. (15 kwh) capacity. It also incorporates a built-in charger so that at the end of the shift it can be driven up to a mains point to which it is plugged in. The charger design is such that when the battery reaches full charge, the supply is automatically terminated.

TECALEMIT, LIMITED, Plymouth, announce that an improved version of their suction oil gun having a greater capacity, but no dearer than the superseded model, is now available. This gun has a 9-oz. capacity as against 5½-oz. formerly, and is for use with oil. It can be used to top up vehicle gear boxes, rear axles, shock absorbers, etc., and can be put to several other uses in industry.

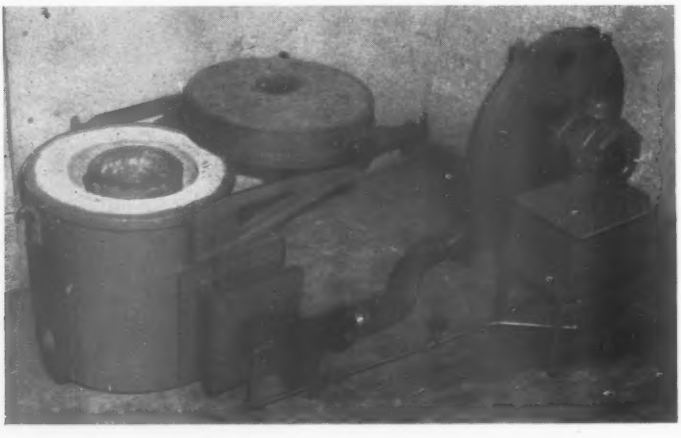

FIG. 1.—*New oil-fired self-contained crucible furnace introduced by Norris Equipment & Construction, Limited, of Bristol.*

International Views on Foundry Ventilation

(*Continued from page 101*)

This series of abstracts from papers on foundry ventilation presented at the twenty-fourth International Foundry Congress in Stockholm last year concludes with an Italian contribution which forms a singularly appropriate follow-up to the extracts already published in that it describes the practical steps taken in an actual foundry to overcome the variety of atmospheric contamination outlined, for the most part theoretically, in the earlier discussions of the subject. The Paper comprises a report on the smoke- and dust-exhausting systems installed in the cast-iron and aluminium alloy departments of the Fiat Foundry plant in Turin, Italy. dealing in turn with measures adopted for 12 specific groups of machines, and concludes with a statistical assessment of the success achieved by their means.

Air Pollution and Dust Control in a Foundry

*By Antonio Riggi**

[SUMMARY]

The Author gives a concise description of the smoke- and dust-exhausting systems installed at the Fiat Foundry plant in Turin in order to keep the atmosphere free from air contamination. The foundry produces motor-car and truck parts. Special attention is given to a detailed description of a cast-iron and aluminium complete production cycle with regard to the dust- and smoke-exhausting systems already installed.

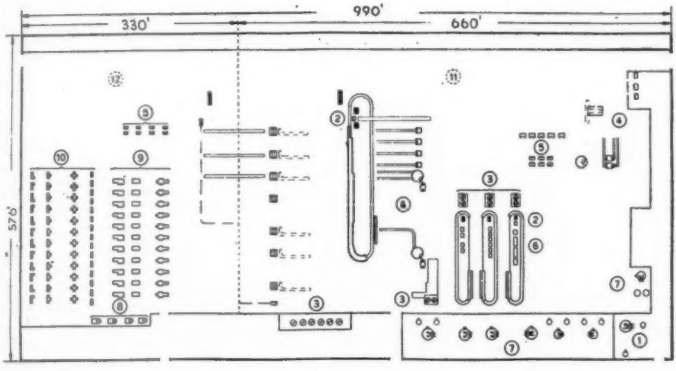

FIG. 1.—*Plan of the Fiat Foundry in Turin, Italy. Numbers show the zones in which dust samples were periodically taken. The air is changed about three times per hour by means of fans of an exhausting power of about* 1.600 *actual h.p.*

Key: (1) Preparation of refractories. (2) Shakeout. (3) Sand handling. (4) Casting cleaning (blast-room—tumbling mills). (5) Snag grinders. (6) Moulding and pouring. (7) Cast-iron electric melting. (8) Aluminium gas-operated melting. (9) Aluminium pressure die casting. (10) Aluminium permanent-mould casting. (11) Basement below the cast-iron working floor. (12) Basement below the aluminium working floor.

The machinery installed in the cast-iron casting department consists of electric melting furnaces and pouring loops for the continuous pouring of moulds while in the aluminium-alloy casting department there are ranges of gas melting furnaces together with gas and electric holding furnaces. Car and truck parts are mainly die-pressure cast and permanent-mould cast.

Below groups of machines installed at the cast-iron and aluminium-alloy casting departments are listed. Each group is provided with an independent smoke-exhausting system.

In the cast-iron casting department are:—(*a*) one 18-ton and three 12-ton arc melting furnaces, (*b*) two 12-ton arc refining furnaces, (*c*) one 1-ton arc melting furnace, (*d*) one pouring loop for the production of cylinder blocks—64 flasks per hour, (*e*) two pouring loops for the production of various car and truck parts—466 flasks per hour, (*f*) one pouring loop for the production of truck parts—60 flasks per hour, (*g*) one revolving-barrel shot-blasting machine—production three tons per hour, (*h*) 11 double-wheeled snag grinders, wheel diameter approximately 17 in., (*i*) three tumbling barrels for the preparation of the furnace charges.

In the aluminium-alloy casting department are:—(*a*) two 1-ton per hour and two 2-ton per hour gas melting furnaces, (*b*) 10 pressure die-casting machines from 400 to 800 tons each, (*c*) six induction electric melting and holding furnaces and eight hydraulic drawing machines for permanent-mould casting.

The last section of the Paper refers to prolonged tests carried out by means of proper instruments in order to determine the amount of dust and free silica contained in the air circulating in a foundry equipped with smoke-exhausting systems. The figures obtained from tests compared to the data gathered from other Author's studies on the same

* The Author was born in 1902 and graduated in industrial engineering, Polytechnic of Torino. He is at present Head of the Technical Co-ordination Service at F.I.A.T. Foundry Department, Torino, Italy. He was formerly Chief of Quality Control at Alfa Romeo Aircraft Department and Technical Inspector at R.I.V. of Torino. The paper here presented in abstract was originally an official exchange paper from Associazione Italiana di Metallurgia.

subject proved to be well within the bounds generally acknowledged as being necessary to ensure hygienic conditions of work.

Production Methods

The installation of smoke- and dust-exhausting systems in foundries is the main factor in the progress towards greater efficiency and better health among foundrymen. During the past 30 years, owing to the melting and casting systems in use, it was practically impossible to get rid of the air contaminants in spite of many efforts and much expense. In modern foundries, however, where production is mechanized and centralized it has been possible to capture both smoke and dust as they appear and evacuate them. But control of air-pollution is still a subject of great interest since different kinds of smoke-exhausting systems should be adopted according to the different types of production and consequently to the different machinery installed in foundries.

The Author demonstrates his point by means of diagrams, technical data and photographs showing the cast-iron and aluminium-alloy casting

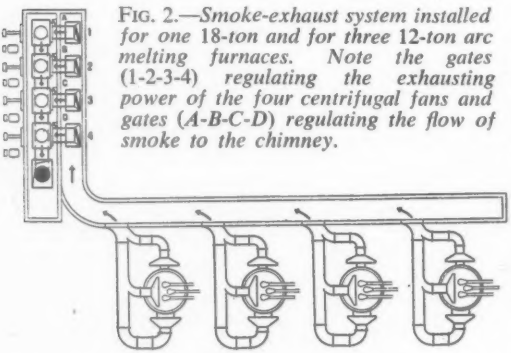

FIG. 2.—*Smoke-exhaust system installed for one* 18*-ton and for three* 12*-ton arc melting furnaces. Note the gates* (1-2-3-4) *regulating the exhausting power of the four centrifugal fans and gates* (*A-B-C-D*) *regulating the flow of smoke to the chimney.*

departments for the production of motor-car and truck parts at the Fiat Foundry in Turin, and describes in detail the smoke- and dust-exhausting systems installed on the machinery producing cast-iron castings weighing from a few pounds to a third of a ton and aluminium castings weighing from a few oz. to 800 lb. In his report he does not mention the air-change and air-heating systems.

Cast-iron is mainly poured into sand-moulds while also shell-moulding and centricast moulding are adopted. In the aluminium-alloy casting department pressure die-casting and permanent mould casting predominate. There is also a bay for sand-moulding. Zinc-alloy production is obtained by pressure die-casting.

Fig. 1 shows the total area covered by the cast-iron production departments, offices and casting stores, in which the coremaking area is included. Light-alloy production area is about half as much as the cast-iron departments, coremaking area included. Productive workers are about 2,100, none of whom work in the basement in which the smoke-exhaust systems are installed. The production totals about 120 tons of cast-iron cleaned castings and about 45 tons of non-ferrous alloy cleaned castings a day, in two shifts of work. Owing to the installation of new and more productive equipment these figures are steadily increasing.

Since centralization of machinery is becoming a general trend in most foundries, the amount of contaminants in the air will ever increase. That means that new problems are to be faced and studied by the technicians and engineers designing new foundry plants.

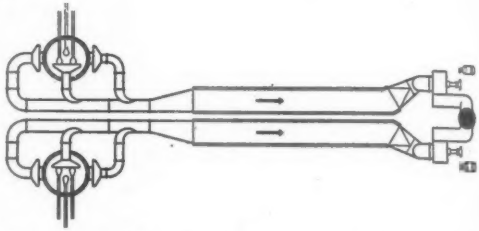

FIG. 3.—*Smoke-exhaust system installed on two* 12*-ton refining furnaces* 112 *ft. long each. Cross-section* 5 *ft. by* 29.5 *ft.*

Cast Iron Melting Furnaces

Description is given of the installations with regard to each as a potential smoke- or dust-producer which has been controlled by smoke- or dust-exhausting systems. First cast-iron melting furnaces are discussed. Cast-iron is molten following the "Triplex" system using arc melting and refining furnaces and low-frequency electric furnaces. At the Turin Foundry a sturdy glass partition provided with sliding doors separates this department from the others. Smoke-exhaust systems, complete with hoods, pipings, duct-works and centrifugal fans conveying dust and smoke to the chimney are installed on groups of melting and refining furnaces. Holding furnaces do not have their own

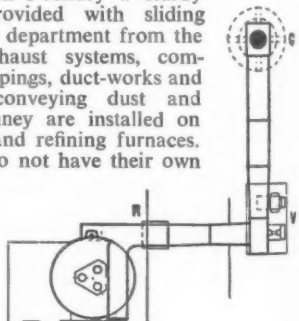

FIG. 4.—*One-ton arc melting furnace and smoke-exhaust system. During the furnace tilting movement the pipe rotates around the bearing discs* (*R*).

smoke-exhaust system, but utilize the numerous helical fans installed on the shed roof to evacuate the residual smoke in the work-space.

Melting Furnaces

Speaking of the smoke-exhaust system for four

melting furnaces (Fig. 2), the Author says because the crown is displaced, when charging, with regard to the position of the crucible and since during pouring furnaces have a tilting movement together with the hoods and pipings, some very interesting work had to be performed. For instance, telescopic pipings, hoods on rail-mounted rollers and stationary pipings connected by means of bearings-discs to the movable pipings had to be installed.

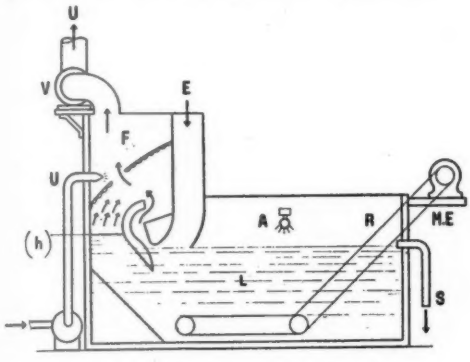

FIG. 5.—*Wet dust-collector used in different sizes and capacities at the Fiat Foundry in Turin.*

F Filter, L Water-tank, R Sludge scraper, V Fan, ME Electric motor, P Water pump, (h) Water-level.

Small-capacity Melting Furnaces

Fig. 4 shows the solution already adopted for foundry smaller equipment smoke-exhaust systems. The equipment referred to is a one-ton melting furnace. Instead of a duct-work there is a sheet steel-pipe. All these smaller furnaces are electrical.

Refining Furnaces

The molten cast-iron is charged into these furnaces by means of ladles, the crown being stationary. No telescopic pipings are needed and the hoods do not travel on bearing discs. To facilitate the furnace maintenance on both pouring and smoke-exhaust sides pipes and hoods rotate on bearing discs. Fig. 3 illustrates the smoke-exhaust system installed on two refining furnaces. Since a percentage of smoke escapes through the openings situated on the furnace crown to allow space for the movements of the electrodes, special attention had to be given to solve this problem and consequently hoods were installed on this side of this furnace.

Continuous-pouring Loops

By means of electric trucks travelling on the working-floor or by monorail overhead trucks the ladles containing molten cast-iron are transported to the pouring loops. Owing to the ever increasing mechanization of the foundry industry the various operations of a continuous-cycle production start from the sand-preparation unit to end, when castings are already cooled, at the knock-out station from where they are sent to the finish department.

Before going farther on with the description of a continuous-pouring loop the main characteristics of the "wet" dust-collectors installed at these pouring loops must be described. The dust-collector in question is provided with a water-tank and a sludge scraper for the automatic discharge of the sludge formed by dust and water. Fig. 5 illustrates the principle on which this system is based.

The air contaminated with dust is taken in through passage E, the water contained in tank L flows from tap A and it is kept at a constant level by an overflow pipe S. The water level is raised (*h*) by the action of the fan V which also atomizes the water coming into contact with the air taken in and which has already glided over the surface of the water contained in the tank. The number of baffles may vary according to the type of dust. The water, flowing from a pressure delivery pump, P, is sprayed through a nozzle, U, situated on the baffle rear-side.

A pouring-loop for medium size castings is described in detail (Fig. 6) and a brief account of two other pouring loops follows.

The maximum weight of a casting obtained in a flask is approximately 242.1 lb. The average output is of 60 tons in 15 hours' work at a rhythm of 64 flasks per hour. Two smaller cylinder blocks are contained in one flask.

The sand-preparation unit, A, is equipped with two mullers of 882-lb. capacity each. In this unit two centrifugal fans are installed, the characteristics of which are: 17½ in. dia., 2,000 r.p.m., and approximately 3,884 cu. ft. capacity per min. Each is equipped with a 25 h.p. electric motor. Another centrifugal fan of 17½ in. dia., 2,200 r.p.m., 6,000 cu. ft. capacity per min., driven by a 30 h.p. motor clears the air from the dust caused by

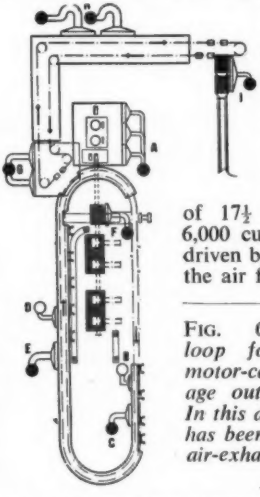

FIG. 6.—*Continuous-pouring loop for the production of motor-car cylinder-blocks (average output: 4 tons per hour). In this drawing special attention has been given to the numerous air-exhaust and air-intake system.*

the mixers, bucket-elevators and other machinery. It is well known that, especially in the past, the sand-preparation units were the most dangerous zones and silicosis was widely spread among the foundrymen working there. The smoke-exhaust and air-intake systems mentioned above proved to be highly efficient and satisfactory with regard to hygienic conditions of work.

Belt-conveyors transport the sand to the moulding machines which are loaded through hoppers. In the pouring loop here illustrated there are four

International Views on Foundry Ventilation

jolt-squeeze moulding machines working two by two, that is, two for the lower moulds and two for the upper moulds. The moulds are closed on the car-type mould-conveyor and when arriving at zone B the cast-iron is poured into the moulds.

This continuous-pouring loop is provided with an air-intake and a smoke-exhaust system. For a certain length the two systems are superposed, though being independent. The upper part consists of a duct provided with adjustable windows of a

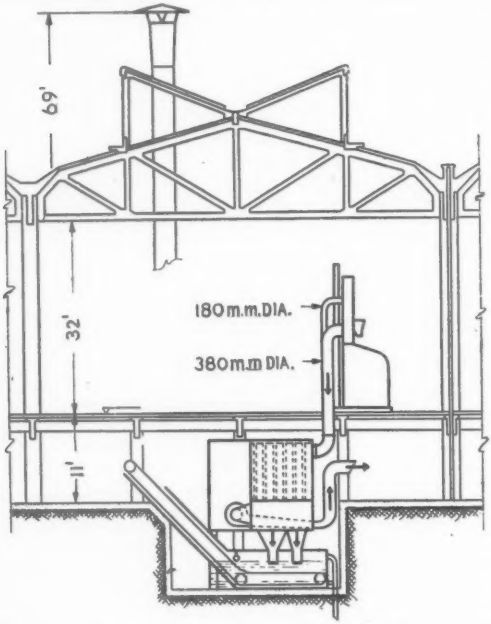

FIG. 7.—*Cut-away drawing of the building and installation of a flat cloth screen dust-collector (total area of the cloth is approximately 2,583 sq. ft. of which 1,937 sq. ft. are actually working) and of the water-tank and sludge scraper to collect the sludge formed by the dust and water from a revolving barrel blast cleaning machine.*

maximum total area of about 12.5 sq. ft. through which fresh air is taken in by means of a helical fan of 31 in. dia., 950 r.p.m., 6,000 cu. ft. capacity per min., driven by a 2 h.p. motor. The lower part consists of two sections in which two different types of smoke exhausters (Fig. 6 C and E) are installed. In the first section under the air-intake duct, a centrifugal fan of 17½ in. diameter, 2,000 r.p.m., approximately 3,884 cu. ft. capacity per min., driven by a 45 h.p. electric motor provides to the absorption of the smoke produced by the cast-iron pouring and has no dust-collector. The second section, which is a 164 ft. long tunnel into which run the car-type mould conveyor carrying the moulds, is provided with a fan (shown in Fig. 6 at E) which, having to absorb the oily smoke due to the combustion of the core-binders, is provided with a "wet" dust-collector and a sludge scraper. This centrifugal fan has 29 in. dia., 1,000 r.p.m., approximately 16,000 cu. ft. capacity per min., and is driven by a 52 h.p. electric motor.

Near the end of the tunnel an air-intake duct D is superposed. This duct is also provided with adjustable windows of a total area of about 23 sq. ft. The fresh air is brought in by means of a helical fan of 35 in. dia., 950 r.p.m., 9,886 cu. ft. capacity per min., driven by a 3 h.p. electric motor.

The moulds are shaken out in three operations: (1) The upper flasks are drawn up by means of bails and put on the shake-out. (2) The castings are picked-out from the lower flasks as they enter and are transferred to the monorail conveyor baskets. (3) The lower flasks are discharged from the car-type conveyor and sent on the shake-out by means of a pneumatic pusher.

The dust generated by the shake-outs is collected by means of an exhaust hood connected to a duct going down into the basement under the floor-line where is installed a centrifugal fan of 19 in. dia., 1,310 r.p.m., 7,415 cu. ft. capacity, driven by a 31.5 h.p. electric motor. Smoke in the room G (Fig. 6) where castings are transferred on the monorail conveyor is evacuated through the roof by means of two helical fans of 41 in. dia., 950 r.p.m., 14,124 cu. ft. capacity per min., each being driven by a 8.65 h.p. electric motor. The monorail conveyor under the floor-line travels through a 229 ft. long tunnel. The smoke-exhaust system consists of two centrifugal fans provided with wet dust-collectors and sludge scrapers installed at H. The characteristics of these centrifugal fans are: 48 in. dia., 710 r.p.m., 26,483 cu. ft. capacity per min., each of them is driven by a 70 h.p. electric motor. The conveyor then goes back to the working-floor where the castings loaded on the conveyor baskets are, by means of a tilting movement of the baskets, thrown on the vibrating screens to be knocked out. Apron conveyors then transport them to a station where sprues and risers are separated from the castings.

In zone I smoke is evacuated by means of an exhaust hood and a centrifugal fan of 19 in. dia., 1,230 r.p.m., 7,415 cu. ft. capacity, driven by a 20 h.p. electric motor, through a wet dust-collector provided with a sludge scraper.

Pouring Loops for Miscellaneous Castings

The total production of the two pouring loops for miscellaneous castings is of 25 tons in 15 hours' work, 126 flasks per hour on one pouring loop and 340 on the other. The castings fall, through hoppers, on vibrating screens to be transported to and automatically loaded on the monorail conveyor baskets which runs through a 229 ft. long tunnel. After passing in the tunnel the conveyor reaches the working-floor again where castings, by means of a tilting movement of the baskets, are thrown on the vibrating screens.

Pouring Loops for Large Castings

Systems installed in the continuous pouring loop for large castings are different from the ones so far described owing to the larger dimensions of the flasks (castings weighing up to 661 lb.) and to the larger amount of dust and smoke produced during the production cycle. The casting-cooling tunnel is shorter than the others being only 59 ft. long and therefore it has been necessary to install a centrifugal fan of 35 in. dia., 710 r.p.m., driven by a 35 h.p. electric motor, to take fresh air in. A smoke-exhaust hood is installed in front of a shake-out. The shake-out bays and likewise the sand-preparation units were the most dangerous areas with regard to the danger of silicosis in old-fashioned foundries. Smoke- and dust-exhaust systems made these areas quite safe from free silica.

Cleaning and Snagging Installations

Castings, before being sent to the workshop to be machined, have to pass through the cleaning and snagging operations. At this stage of the production cycle hot, wet and oily dust is no longer produced and therefore dry dust-collectors will be much more effective than wet dust-collectors because they will be better able to retain some kinds of impalpable dust. Dry dust-collectors may be either of the flat cloth screen type or of the vertical cloth tube type. They are both self-cleaning since an automatic periodical shaking of the screens or of the tubes by means of a vibrator frees them from the dust.

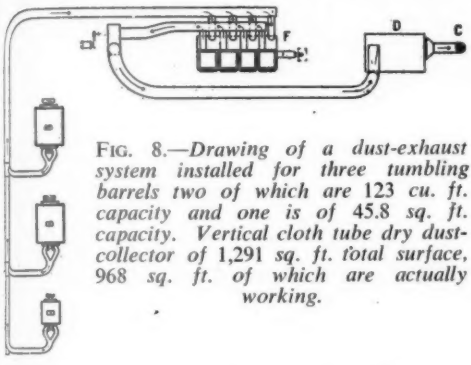

FIG. 8.—*Drawing of a dust-exhaust system installed for three tumbling barrels two of which are* 123 *cu. ft. capacity and one is of* 45.8 *sq. ft. capacity. Vertical cloth tube dry dust-collector of* 1,291 *sq. ft. total surface,* 968 *sq. ft. of which are actually working.*

Blast Cleaning

Fig. 7 shows the cross-section of a flat cloth screen dust-collector installed on a revolving-barrel blast-cleaning machine.

It should be noted that a water-tank and a sludge scraper have been connected to the flat cloth screen dust collector to *facilitate* automatic collection of sludge. This is most useful since the normal way of collecting dust in a large bin which, if not perfectly closed, will release the dust free in the atmosphere again. The basement under the floor-line of the foundry proved to be very useful for the installation of the dust-collectors, which, owing to their dimensions, would have been an obstacle if installed on the working-area. The dust-collector's efficiency ensures that the air is freely let out in the basement.

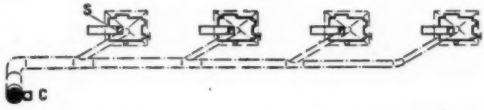

FIG. 9.—*The fume-exhaust system installed for aluminium melting furnaces (two* 1 *ton per hour and* 2 *ton per hour furnaces.) The helical fan has* 4*ft. dia.,* 900 *r.p.m.,* 42,300 *cu. ft. capacity per min., and is driven by a* 25 *h.p. electric motor.*

Snagging

Double-wheeled snag grinders are employed for casting snagging in the dust-exhaust system installed on snag grinders. Alundum resin bonded wheels are used because, among other advantages, they produced a small amount of silica in comparison with the prior carborundum wheels bonded with ceramic materials. Highly-efficient dust-exhaust systems were therefore required to get rid of the air-contaminants and the systems installed ensured hygienic conditions of work even in the areas which were considered as being the most dangerous in a foundry The amount of free silica may be now considered as being a negligible quantity.

Tumbling Barrels

In a foundry equipped with electric melting furnaces, cleaning of cast-iron sprues and gates before their reutilization is of the utmost importance (see Fig. 8). The dust generated from the tumbling barrel is of the heaviest type and impalpable. Owing to these characteristics such dust is not freely released, but after passing through the dust collector is conveyed to a decantation room and from there to the chimney.

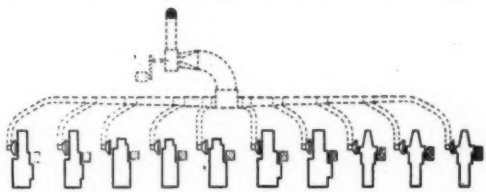

FIG. 10.—*Drawing of the exhaust system installed for three* 400*-ton, five* 600*-ton and two* 800*-ton aluminium pressure die-casting machines. Centrifugal fan of* 5.9 *ft. dia.,* 480 *r.p.m.,* 46,000 *cu. ft. capacity per min., driven by a* 75 *h.p. electric motor.*

Aluminium Department

In this department there is little consumption of sand either for moulding or coremaking. The pro-

duction is mainly obtained through pressure die-casting and permanent-mould casting. But there is a large amount of fumes also because oils are used to clean the dies and moulds. If not captured on the spot such fumes may be harmful to the eyes and give ocular trouble. The installation of the dust- and fume-exhaust systems described below helped to solve this main problem satisfactorily.

Melting

Aluminium is molten in tilting furnaces and smoke exhaust is obtained through an exhaust hood installed on each furnace near the charging throat. The tipping skips containing aluminium scraps or piglets are lifted up by means of an elevator and the smoke escaping from this throat is captured on the spot. In Fig. 9 the fumes exhaust system installed for a line of aluminium-melting gas furnaces is shown.

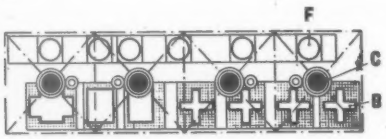

FIG. 11.—*Drawing of the fume-exhaust system for a group of six induction electric furnaces (F) and for eight hydraulic drawing machines. Each helical fan has* 3.3 *ft. dia.,* 950 *r.p.m.,* 28,000 *cu. ft. capacity per min., and is driven by an* 8 *h.p. electric motor.*

Pressure Die-casting

The fume exhaust system installed for a group of pressure die-casting machines can be seen in Fig. 10. The stationary ducts going down below the working-floor are connected to the movable pipings, which bear the exhaust hoods, by means of frontal flanges which can be easily and quickly disassembled. In these machines are two sources of smoke and therefore two exhaust hoods have been installed. The bigger one is in front of the die and the smaller one is situated above the charging throat where aluminium is charged into the container.

Permanent-mould Casting

The plan of a group of furnaces and hydraulic drawing machines for the production of cylinder heads and gearboxes can be seen in Fig. 11. The moulds used for such production require a type of cores which, when pouring the molten metal, produce large quantities of oily fumes. In this case fume-exhausters are not placed very near to the fume sources, but exhaust hoods are installed at a considerable height to cover all the working zone and collect all the fumes. When this system was being tested it was noticed that when the helical-fan motors were running the hoods vibrated producing a troublesome noise. This inconvenience was overcome by means of rubber shims inserted between the supporting frame and the hood and by painting the hoods with coats of deadner varnish.

Investigation of Atmospheres

It is well-known that special instruments have been designed in order to determine the amount of dust and smoke contaminating the atmosphere in foundries. To evaluate an existing or potential hazard in the atmosphere of workspaces numerous investigations have been performed at the Fiat Foundry and the most suitable instruments were employed. Dust counts and dust-particle measurements may vary on a quite large range according to the instruments used and also to the operators. The instruments used for th investigation require description.

Thermic Sampler

This instrument is based on the principle that solid particles suspended in a gas through which a stream of heat passes, have the tendency to move towards a lower temperature and precipitate on the cold surfaces of the slips of glass. The thermic sampler employed operated on 120 V. 2.2 amp. and through it 25 cu. cm. of gas was drawn. Dust counts were made by means of a microscope of a magnification of 200 diameters. Particles were classified according to their sizes. Particles were first counted as a whole and then those less than five microns in size were counted.

Konimeter

From the various types of konimeter available the Sartorious type which draws 2.5 or 5 cu. cm. of gas at a time was chosen. The entrapping medium was a disc coated with vaseline. When the gas changes its direction the dust deposits on a section of such disc of 1 sq. mm. This device secured 26 consecutive samples and simply rotating the disc of 180 deg. it was put under an embodied microscope of a magnification of 200 diameter, to enable the operator to count the particles which, as already said, are first counted as one group before those less than 5 microns in size are counted. This count was made on the ratio of 1 $cm.^3$ of gas.

With this konimeter it was possible to count particles whose sizes are from 10 to 1 microns while with the thermic sampler it was possible to get a wider range of sizes. To determine the free silica contained in the zone being investigated 5 gram of dust have to be collected and that is not possible with the above-mentioned instruments.

Electrostatic Sampler

On this instrument dust deposits on the walls of a precipitation chamber when the gas is drawn through an electrostatic field of 12,000 V. 10 Ma. The capacity of this instrument is of 3 cu. ft. per min. The precipitation chamber after having been left in the zone for some hours is disassembled twice, that is, before and after exposure. This system also makes it possible to obtain the weight per cu. ft. of gas of the dust contained in the gas which already passed through the instrument.

Diffraction-meter with Geiger-counter

This instrument is bulky and is based on the different diffraction of X-rays with regard to the

different types of ores of which dust is composed. The method employed by Debye-Scherrer makes it possible to infer the percentage of free silica contained in the dust. The total amount of dust examined through this instrument and the percentage of both the particles 1 to 5 microns in size and less than 1 micron in size contained in the dust are known. Particles have been counted by means of a microscope of a magnification of 200 diameters. It is therefore possible to establish the percentage of free silica contained in the dust, the particles of which are 1 to 5 microns in size, simply making a proportion between the particles of different sizes.

Details of Results

Investigations were made using a microscope of a magnification of 200 diameters which makes it possible to count particles having a size not less than 1 micron. For some time it has been well known that particles more than 3 microns in size are not dangerous as they do not go down to the bronchias because they are retained by the mucosa of the respiratory tract. To fix a safety limit the particles from 1 to 5 microns in size were taken to be dangerous. Lately it has been ascertained that dust containing particles less than 1 micron in size is not harmful because it contains so small an amount of free silica. Consequently the Paper deals with particles of 1 to 5 microns in size.

It should be noted that the number of particles having less than 1 micron in size which could be counted (for instance, by means of a microscope of a magnification of 2,000 diameters) amounted to a greater number. This number cannot be compared with the figures given in this report since the investigations in question were made using a microscope of 200 magnification. Table I shows the figures relating to the particles that were counted.

Having provided to the installation of the machinery in the sand-preparation unit on a vertical line and also to the installation of highly efficient exhaust hoods for the snag-grinders station, the most dangerous spots were neutralized. The most difficult zones to be cleared, owing to their large surface areas, are still the preparation of refractories units and the shake-out zones. But in spite of the well-known difficulties the figures obtained in the investigations were below the maximum permissible limits. In all the other zones the foundry described is definitely below the figures given as acceptable limits and the workers enjoy hygienic conditions of work not much different from the working-conditions existing in a mechanical work-shop.

Acknowledgment

The Author expresses his gratitude to the Fiat Foundry in Turin for help and assistance which enabled him to illustrate some of the smoke- and dust-exhausting systems already installed at the foundry departments.

TABLE 1.—*Dust and Free Silica Sampling in Work-spaces.*

Zone, see Fig. 1.	Departments. Operation.	Dust and Free Silica Emission. Concentration (Classification A.F.S.*)	Particle size.	Free silica, per cent.	Dust and Free Silica-Counts Average. Konimeter Sartorius Magnifications 200. Particle size 1-10 μ. per cu. cm.	Particle size 1-5 μ. Per cent.	Particle size 1-5 μ. Part per cu. cm.	Free silica. Particle size 1-5 μ. Per cent.	Particle size 1-5 μ. Part per cu. cm.
1	Preparation of refractories	Moderate	Medium	High	500	50	250	50	125
2	Shakeout	,,	,,	,,	450	50	225	50	112
3	Sand handling	,,	Fine	,,	265	75	200	50	100
4	Casting cleaning (blast-room tumbling mills)	Heavy	,,	Medium	380	90	340	15	51
5	Snag grinders	Moderate	Medium	,,	400	65	260	15	39
6	Moulding and pouring	,,	Fine	,,	285	90	256	15	38
7	Cast-iron electric melting	Light	Impalpable	Low	1,000	100	1,000	5	50
8	Aluminium gas-operated melting	,,	,,	,,	170	100	170	5	8.5
9	Aluminium pressure die-casting	,,	,,	,,	230	100	230	5	11.5
10	Aluminium permanent-mould casting	,,	,,	,,	220	100	220	5	11
11	Basement below the cast-iron working floor	,,	,,	Medium	229	100	229	15	26
12	Basement below the aluminium working floor	,,	,,	Low	195	100	195	5	9.75

* American Foundrymen's Society.

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ECSC Pig-iron and Steel Output

Output of crude steel (ingots and castings) in the European Coal and Steel Community in January reached 5,379,000 *tonnes*, according to provisional figures published by the statistics division of the ECSC High Authority. This figure was only slightly lower than the record amount of 5,429,000 *tonnes* reached last October, and was substantially higher than the totals of 4,995,000 *tonnes* for December, and 5,099,000 *tonnes* for January, 1957.

Germany, last month, reached 2,219,000 *tonnes*, compared with 1,987,000 *tonnes* in December, and 2,055,000 *tonnes* in January, 1957. Similar returns for other ECSC countries are:—Saar, 308,000, 279,000, and 296,000 *tonnes*; Belgium, 555,000, 537,000, and 575,000 *tonnes*; France, 1,325,000, 1,266,000, and 1,207,000; Italy, 575,000, 558,000, and 558,000 *tonnes*; Luxembourg, 295,000, 273,000, and 301,000 *tonnes*; Netherlands, 102,000, 95,000, and 107,000 *tonnes*.

Production of pig-iron and ferro-alloys was also running at a near-record level in January, reaching 3,930,000 *tonnes*, compared with 3,841,000 *tonnes* in December and 3,753,000 *tonnes* in January, 1957. The record, also for last October, stands at 4,016,000 *tonnes*.

Comparative figures for ECSC countries, similar to those for steel, are:—Germany, 1,601,000, 1,547,000, and 1,514,000 *tonnes*; Saar, 272,000, 260,000, and 253,000 *tonnes*; Belgium, 485,000, 482,000, and 498,000 *tonnes*; France, 1,072,000, 1,050,000, and 985,000 *tonnes*; Italy, 159,000, 167,000, and 153,000 *tonnes*; Luxembourg, 284,000, 272,000, and 286,000 *tonnes*; Netherlands, 57,000, 63,000, and 64,000 *tonnes*.

Latest Foundry Statistics

Iron Castings

The Iron and Steel Board states that the production of iron castings in the fourth quarter of 1957 was 962,050 tons. For the year 1957 the output was 3,715,100 tons as against 3,899,170 tons in 1956.

British-made Atomic Plant for Japan

Japan has decided to buy its first atomic power station from Britain. Last week it was announced by Mr. Daigoro Yasukawa, chief of the Japan Atomic Power Company's negotiating mission, that official specifications had just been issued for nuclear power plant with an output of 150 megawatts. Tenders have been invited from the General Electric-Simon-Carves Atomic Energy Group, Limited, the A.E.I.-John Thompson Nuclear Energy Company, Limited, and the English Electric-Babcock & Wilcox-Taylor Woodrow consortium. The order is likely to be placed by September and it is hoped that the reactor will come into operation by 1963.

The specifications are for the supply by the successful British contractor of the complete plant including generating machinery, but the mission has suggested that Japanese sub-contractors should share in the supply and erection of auxiliary equipment. Dr. Yasukawa could not give any estimate of the probable cost of the plant, but it is understood that such a station will cost between £20,000,000 and £30,000,000.

New Company unites Lifting-appliance Manufacturers

Lifting-gear specialists are to join forces in a new company, Herbert Morris-Brown Lenox, Limited. The participants are Herbert Morris, Limited, crane and lifting equipment manufacturers, and Brown, Lenox & Company (London), Limited, which provides lifting-gear servicing facilities in the south of England. The new company begins operations at Millwall, London, E.14, on April 1, and will continue the work of the existing lifting-gear department of Brown Lenox, at the same time taking over the spares and servicing organization for Morris equipment.

The management of the new company will be the same as that which now operates the chain and lifting gear service department of the Millwall works of Brown Lenox.

National Foundry College students examine samples, equipment and materials after hearing a lecture on the use of "Epikote" resins in the manufacture of foundry patterns. The lecturer was Dr. G. Powell (second from left, in white coat) from the technical service laboratories of Shell Chemical Company, Limited, Egham, Surrey, who visited the College with a mobile demonstration some weeks ago. During his talk he demonstrated the techniques of mixing and pouring resin foundry patterns and explained the advantages of resins over traditional materials. (An article on the practical application of epoxy resins in foundry patternmaking is shortly to be published in the JOURNAL.)

Canada's New Aluminium Smelter

British Investment at Baie Comeau, Quebec

Less than 20 months after work commenced on clearing the site, the first metal was poured on December 23, 1957, at the new aluminium smelter of the Canadian British Aluminium Company, Limited, at Baie Comeau, in the Province of Quebec on the north shore of the St. Lawrence River, 400 miles north-east of Montreal. One of Britain's most important investments in Canada in recent years, the company is a subsidiary of the British Aluminium Company, Limited, and has been formed in partnership with one of Canada's largest pulp and paper companies, the Quebec North Shore Paper Company.

The event marked the completion of the first of four production stages of the £50,000,000 plant which will eventually have an annual capacity of 160,000 long tons of virgin aluminium ingot. As an indication of the size of the smelter, this ultimate capacity represents two-thirds of the present annual consumption of virgin aluminium ingot in the United Kingdom.

The two furnace-rooms for stage 1 of the new smelter are more than 1,700-ft. long with a rectifier house at one end and a casting shop at the other. In addition the plant comprises a carbon factory, laboratory, service building, workshops and offices, together with alumina and coke silos. Each furnace-room has 84 furnaces of the vertical stub Soderberg type, connected in series. The 3,000-ft. belt conveyor handles at present about 125 tons of coke and alumina per hour and its capacity is designed so that this may be raised to 400 tons hourly. Substantial storage space is required owing to the period of closed navigation on the St. Lawrence, making it necessary to store materials for approximately a four-month period. The wharf, which has been in operation since its completion last September, has three 550-ft. berths which are capable of taking vessels up to 10,000 tons. The steel piles, which are 80-ft. long, are reputed to be amongst the largest ever rolled.

The power for stage 1 (120,000-h.p.) and part of stage II is to be drawn from the nearby Manicouagan Power Company, which is owned 60 per cent. by Quebec North Shore Paper Company and 40 per cent. by Canadian British Aluminium Company. Three new 50,000 h.p. generators have been installed raising the total present capacity to 250,000 h.p. Quebec-Hydro owned by the Province of Quebec is building a large storage dam some miles up the Manicouagan River at Lake St. Anne, to provide a regulated water supply throughout the year for this expansion. Agreements between Quebec-Hydro and CBA have been completed for the remainder of CBA's power requirements.

Electrical Supply

Power is transmitted from the Manicouagan Power Company 11 miles at 161,000 v. to the company's outdoor switchyard, where the electrical supply to the smelter is transformed *via* 161,000 v. air blast switchgear and 115 mva. transformers, of English Electric Company manufacture, down to 33,000 v. for the rectifying equipment for the furnace-rooms and to 13,200 v. for the works distribution supply. The rectifying equipment for each furnace-room comprises eight rectifier banks each consisting of 18 individual pumpless steel-tank mercury-arc rectifiers of British Thomson-Houston manufacture and delivers a total of 100,000 amps at 850 v. to the furnace-rooms. The works distribution supply is taken from a 13,200 v. 15 mva. ring main which interconnects the five works distribution substations providing the 550/110 v. supplies for auxiliary power and lighting.

Carbon Plant

The aluminium-production process requires about half a ton of carbon for every ton of metal produced. This is supplied at Baie Comeau from a carbon factory and the two main products are carbon paste for the anodes of the furnaces and carbon mixture for lining the furnaces. The plant is one of the most up-to-date and highly mechanized in the world.

Treatment of the calcined coke from its withdrawal from storage in two 6,000-ton silos involves drying in a rotary oil-fired drier and its separation into various size fractions from ¼ in. to dust by screens, the finer sizes being made as required by reducing any excess coarse materials first in roll crushers and subsequently in an air-swept ball mill. Predetermined quantities of each size fraction of coke are then blended and fed to the continuous mixers with molten pitch. The pitch is melted and all subsequent lines of the mixers are kept hot by circulating hot hydrotherm fluid.

The mix emerges from the continuous mixers as paste in 2¼-in. strips which are cut in briquettes. The briquettes are cooled and stored ready for feeding to the

(*Continued on p. 246, foot of col. 2*)

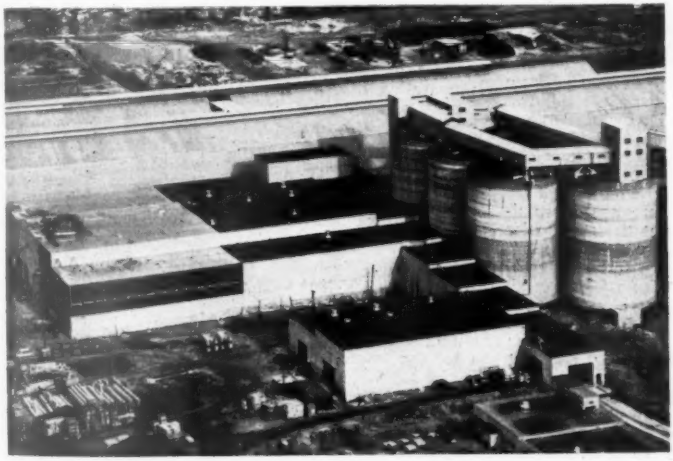

FIG. 1.—*View of the new aluminium smelter of the Canadian British Aluminium Company, Limited, situated at Baie Comeau, Quebec, on the north shore of the St. Lawrence River.*

Foreign Economic Reports

The following extracts have been prepared from recent economic reports emanating from the Export Services Branch of the Board of Trade. In each case an attempt is made to include mention of trends which may influence foundry business.

China: The Chairman of the State Planning Commission has said that the Chinese can now design and build all their large and medium-size enterprises, including iron and steel plants, non-ferrous metal plants, coal mines, power stations, refineries, chemical works, etc. It will, however, he said probably take 20 years to build China into a modern industrial state. He forecasts that by 1972 iron and steel output will be around 40,000,000 tons, 6.6 times the 1957 output: and estimates that China has reserves of 12,000,000,000 tons of iron ore and one-million million tons of coal.

Federal Republic of Germany: The most important economic event in recent months was the decision to raise steel prices by between three and five per cent., the actual increase depending upon the product and individual assessments of market trends. All German steelworks have now raised their prices with the exception of the state-owned Salzgitter works. The increase, according to the German Iron and Steel Association, was unavoidable as the German iron and steel industry was no longer in a position to absorb the higher costs which had developed since steel prices were raised 12 months ago. Until recently, the higher costs have been offset by the proceeds of export sales outside the area of the European Coal and Steel Community, but there has been a noticeable change in the position recently. New orders have for some time been less than current deliveries. This weakening of demand was no doubt one of the reasons why the increase was smaller than the 9 per cent. rise originally contemplated: and the German steel industry is also mindful of the fact that French steel is now competitive in price with many German qualities following the *de facto* devaluation of the franc.

Ghana: A British firm proposes to establish a foundry and rolling mill on the site of the Taquah and Abosso mine which closed down last year as a result of the long mines strike. The mill, which is initially to be a pilot plant, is to be equipped with the most modern electric furnaces. It will use as its raw material ferrous scrap, of which there is a fair amount in Ghana, and will supplement it, if necessary, from imports. It is to produce reinforcing rods, steel strip for machetes and steel grinding balls for the mines. Export of steel scrap has already been banned by the Government.

Japan: Reports of dissatisfaction with the tight money policy in industrial circles were again prominent, but there was no indication that the authorities concerned were ready to listen to complaints more sympathetically than in the preceding months. The Ministry of Finance announced that from October 25, foreign exchange banks would be permitted to make hedging sales of sterling under forward contracts on overseas exchange markets. The facility would be within limited and varied frameworks for different banks, and would be applicable only to convertible American account sterling, with a maximum period of six months per contract. Copper producers have decided to cut production by 14 per cent. for the six months from October 1, in order to counter the depressed condition of the market resulting from the tight money policy in Japan and the fall in prices abroad. The Yawata Iron and Steel Company, together with seven other makers, contracted to supply some 40,000 tons of steel products to the China National Metals Import Corporation. The items contracted for included 12,000 tons of galvanized iron sheet, 10,000 tons of tin plate, 12,000 tons of cold-rolled steel plate, 2,000 tons of hot-rolled thin plate and 5,000 tons of silicon-steel plate.

Federation of Rhodesia and Nyasaland: Roan Antelope Copper Mines, Limited, and Mufulira Copper Mines, Limited, report considerably reduced profits for the first quarter of the financial year beginning July 1, 1957. Compared with the previous quarter, Roan Antelope profits have dropped by about two thirds to £643,000 and Mufulira profits are more than 50 per cent. down at £1,092,000. The Rhodesian Selection Trust Group and the Anglo American Corporation had discussions in October on a joint copper-pricing policy. No agreement was reached, however, and at the request of the British Non-Ferrous Metals Federation the RST group has since reverted to the London Metal Exchange basis of pricing. The group announced in November that development of the Chambishi Copper Mine would be postponed because of the difficulty of raising finance. This is seen locally as a discontinuation of the United States government's interest in investing in the copperbelt mining industry, for the recently opened Chibuluma Mine was developed with the help of a £5,000,000 loan from the general services administration of the American government. The new lead smelter at the Broken Hill Mine in Northern Rhodesia is to close because of the fall in metal prices. The older lead-smelting plant, the operation of which was discontinued when the new plant came into production, is sufficient to handle the reduced production of ore and will be restarted. The Rio Tinto Mining Company of Central Africa, Limited, has ceased underground and pilot plant operations on the Empress Nickel Mine near Gatooma. The prospect is to be put on a care and maintenance basis but further drilling will continue in order to establish extensions of the orebody. Rhodesia Railways continue to move record tonnages of chrome ore and it is hoped that exports will rise to a million tons a year by the end of 1959.

Canada's New Aluminium Smelter

(*Continued from p.* 245)

anodes of the reduction furnaces. The grist for the preparation of the furnace-lining mixture is similar to that for anode grist but with calcined anthracite replacing the petroleum coke and the pitch for the binder being softened by creosote. Lining mixture is made in batch mixers. The plant is designed so that exceptionally close control can be exercised over its operation and operating labour reduced to the minimum by the centralization of all controls into one control room.

The site

Baie Comeau, on the North Shore of the Lower St. Lawrence River, was chosen as the site of the Canadian British Aluminium plant not only because of the adjacent supply of hydro-electric power, a necessity of aluminium refining, but also because it could welcome the newcomer to an established community. This model town of nearly 7,000 was brought into being by the Canadian partner in the aluminium enterprise (Quebec North Shore Paper Company). The official opening of the smelter is expected to be held in the summer of 1958.

Comment :

Using High-carbon Coke for Cupola Melting . . .

By V. C. Faulkner, Hon. M.I.B.F.

For more than a year, small cargoes of high-carbon coke have been coming into this country*. The material has been tried out by a number of ironfounders for use in cupola melting, and many have discontinued its use on the grounds of cost, which is about twice that of National Coal Board foundry coke. However, the Haven Foundry, Limited, Newhaven, has used this new material exclusively for nine months and the writer therefore accepted an invitation to ascertain just what had been accomplished.

Background

In assessing the worth of a foundry process or project, it is wise to know the background conditions. The Haven Foundry was started in 1950 by Mr. G. W. Rousham and Mr. A. S. Webster, on a site quite near to the railway station. The business grew steadily and to-day it employs about 50 men of whom all were recruited locally. The output of iron castings covers a very wide range of sizes and weights; of the total, 15 per cent. goes to the largest customer. There is also a small non-ferrous foundry, capable of turning out castings up to 200-lb. in weight. In short, the set-up is that of a typical jobbing foundry, with the attribute that the exterior façade is both smart and attractive.

Cupola Melting Plant

The melting plant for iron is a Roper No. 3½ standard "Economic" cupola without a receiver. It is fitted with an inclined-hoist type of bucket charger. The maker's output rating is 2 tons per hr. when lined to 39-in. dia. and in actual fact the daily melt of iron is of the order of 5 to 6 tons, which results in a yield of about 66 per cent. of good castings. The temperature of metal at the spout is of the order of 1,425 deg. C.

First, it should be borne in mind that this high-carbon coke has half the volume of coke for the same weight and costs twice as much. An economy first noted is that a typical charge consisting of 1½-cwt. Ford pig-iron; 1½-cwt. machinery scrap; 1½-cwt. foundry returns and 7-lb. limestone now needs 30 lb. of the high-carbon coke for melting instead of 56-lb. of ordinary foundry coke (although ordinary coke is still used for the bed). Another effect of the new coke quickly shown was a substantial reduction in the number of hoists to be made up the charging incline, so much so that it has meant a reduction of "half a man" on the cupola manning cost. This factor, coupled with reduced storage space and handling costs, should assume some importance in larger concerns. There has been a reduction in the amount of limestone used, as there is but little ash to flux—with the indirect result that the bill for ganister has been reduced by 50 per cent. and with this is associated reduced man/hours for patching. Before the changeover, the cupola was rebricked every four months—now it has run for eight months without a major repair.

Other Results

Another economy is that before using this special coke, it was deemed necessary to add manganese and other alloys to take care of high sulphur, now no such additions are necessary. Moreover, opening of the slag notch during a blow is eliminated. "Dull" metal is never encountered and whilst it is difficult in a smallish jobbing foundry to institute a meticulous quality control, it is interesting to note that customers have asked the reason for the improvement in the castings delivered in recent months. Another noteworthy feature is that this cupola, rated at 2 tons per hr. capacity, now can easily be stepped up to 3 tons per hr. The blowing fan is normally set at about half its rated volume output and gives a reading on the water gauge of 15 in. The overall cost of fuel used in the foundry over the last six months is £3 4s. 4d. per ton of metal melted as compared with £2 19s. 6d. per ton for a similar period when running on ordinary foundry coke, although there was an increase in the cost of the latter material in the comparative period.

Obviously, cost records in a jobbing foundry are not taken to "highlight" any one particular feature but as an aid to the preparation of a balance sheet and as a guide to selling price. Nevertheless, Mr. Rousham feels sure that since going over to the new fuel, his profits have increased. His objective in permitting the publication of these data is primarily to interest other founders in making systematic trials of this fuel. Only by more general adoption, can future supplies of the coke be ensured, let alone such important factors as possible lower prices as a result of increased imports (or even the ultimate installation of plant for producing this sort of coke in the UK).

The enterprise shown at Newhaven in carrying out these trials is commendable, because only in this way can full facts be brought to light. It is interesting to note that in other directions trials are also being carried out on long-term tests at the Newhaven foundry, and in particular a "Cupoila" is under test, which seems to offer the elimination of bulky high-ash coke from the foundry. In congratulating Mr. Rousham on this type of forward thinking, the writer records appreciation also for his kindness in supplying the figures on which this article is based. Comments would be welcomed from others who have experimented with the high-carbon type of fuel.

* Imported by Charrington, Gardner, Locket (London), Limited, Tower House, Trinity Square, London, E.C.3.

News in Brief

NOBLE & LUND, LIMITED, has had plans prepared for the erection of a 200 by 50 ft. extension to the foundry at the engineering and machine-tool works at Felling-on-Tyne, Co. Durham.

THE CHANGE OF NAME of Associated Engineering Holdings, Limited, to Associated Engineering, Limited, has been approved by the Board of Trade, and took effect on February 11.

BAKER PERKINS, LIMITED, the Peterborough engineers, has given £3,500 to Peterborough Joint Education Board to pay for the equipment in one of the general science laboratories of the new Peterborough Technical College.

IN CONNECTION with the scheme for improved facilities at Hartlepools Docks the British Transport Commission have placed a contract with Stothert & Pitt, Limited, Bath, for ten 3-ton single-rope cranes and one 10/3-ton single-rope crane. Cowans Sheldon & Company, Limited, Carlisle, will supply one 10-ton 4-rope grab crane.

WORLD NICKEL PRODUCTION, estimated at 230,000 short tons for 1956, has increased to 245,000 for 1957. A further increase to bring the total to 330,000 tons in 1961 is planned. Seventy per cent. of the nickel comes from Canada. Among leading producers is Mond Nickel Company, Limited, of Clydach, Wales, whose estimated annual delivery is given as 25,000 short tons.

FOLLOWING THE RECENT ANNOUNCEMENT by Borax Consolidated, Limited, Carlisle Place, London, S.W.1, that prices for borax and boric acid were to be advanced on February 17, the company now reports that a temporary reduction in ocean freight rates has been secured and this will be reflected in the new prices. Similar reductions are to be made by Borax & Chemicals, 35, Piccadilly, London, S.W.1, for Three Elephant brand borax and boric acid. Full details may be obtained on application to the firms themselves.

SHEFFIELD FIRMS share in an order for £500,000 worth of equipment for automatic-train-control apparatus to be fitted on the main railway line from King's Cross to Doncaster and York. Darwins, Limited, William Jessop & Sons, Limited, Jas. Neil & Company, Limited, Swift Levick & Sons, Limited, and Turton Bros. & Matthews, Limited, will supply between them 2,500 permanent-magnet track inductors and 500 shed test inductors. The first four firms will share an order for 2,100 receiver magnets for locomotives.

THE INSTITUTION OF PRODUCTION ENGINEERS have created two new awards and an additional named paper. They are (1) The E. W. Hancock Paper—to be presented on the subject of "Human Relations in Industry." (2) The Sir Walter Puckey Prize—to be an annual prize of £50 in cash, awarded to a student (not necessarily a member of the Institution) showing outstanding performance in the DIP. TECH. or POST DIP. TECH. as applied to production engineering, and (3) The J. D. Scaife Award—to take the form of a medal awarded for the best paper published in the *Journal* of the Institution, each year, with the exception of named papers.

AS BRIEFLY ANNOUNCED LAST WEEK, a new company British Consolidated Foundry Plant Manufacturers, 12, Hanover Court, Hanover Street, London, W.1, has been formed to handle the production of five firms making different types of plant. Mr. L. B. Partos, the manager, points out that, when an overseas foundry is extending or mechanizing, it is of real advantage to both buyer and seller that there should be co-ordination as to delivery times, shipment and financial arrangements. The basic notion underlying this is worthy of emulation by other groups of suppliers of foundry plant.

MONSANTO CHEMICALS (AUSTRALIA), LIMITED, has entered into an agreement with Drug Houses of Australia, Melbourne, to purchase all outstanding shares of two of that company's subsidiaries—Beetle Elliott Pty. Limited, and Drug Houses of Australia (Chemicals) Pty. Limited. Beetle Elliott manufactures plastic materials, principally phenolic urea and melamine moulding powders, as well as polyvinyl acetate emulsions. Drug Houses of Australia (Chemicals) manufactures sulphuric acid, phenothiazine, some inorganic salts and various agricultural chemicals. Both companies operate plants in the Sydney and Melbourne areas.

PROVISIONAL ARRANGEMENTS for the Royal Visit to Scunthorpe, on June 27, include a visit to the Appleby-Frodingham steelworks in the late afternoon when the Duke of Edinburgh, accompanied by the Queen, will re-light the Queen Victoria blast furnace. It is shortly to be blown out and relined. After tea the Royal Party is to drive through the Redbourn steelworks of Richard Thomas & Baldwins, Limited, and afterwards view John Lysaght's, Limited, steel plant on their way to Immingham where they will rejoin the Royal yacht. The Queen is also expected to visit the North Lindsey Technical College in the early afternoon.

A CONFERENCE on "Noise," dealing particularly with noise in industry, has been organized by the British Occupational Hygiene Society. It will be held in London on Tuesday, April 1, starting at 11.15 a.m., and will be open to non-members of the Society on payment of a registration fee of one guinea. Further details can be obtained from the hon. scientific secretary, Dr. D. Turner, Associated Ethyl Company, Limited, Ellesmere Port, Cheshire. At the conference Mr. T. E. Cawthorne, of King's College Hospital, will discuss physical disturbances produced by noise, whilst Dr. T. S. Littler of the Wernher Research Unit on Deafness will describe the techniques of measuring noise. Dr. A. E. Carpenter, applied psychology research unit of the Medical Research Council, will deal with the disturbance of mental performance caused by noise, and the final aspect of the problem, the suppression of noise, will be dealt with by Mr. N. Fleming and Mr. W. C. Copeland of the National Physical Laboratory.

THE POSITION AND NAME OF "FOREMAN" was strongly defended at the dinner of the Foremen's Club of English Steel Corporation, Limited, Sheffield. Mr. Kenneth Lewis, head foreman in the spring shop, proposed the toast of "The Guests" and said, "There are those who say or imply that the glory has departed from foremanship—that foremen are an anachronism, and an unwelcome reminder of the bad old days when might, not right, ruled the roost. What nonsense this is. It is a proud name to live up to—to act as the name implies, to be 'foremen.' Above all, we should be men." Mr. Lewis said that there had been a move at a South Wales steelworks to get foremen called supervisors, but it was rejected. Managers to-day, he went on, required their specialists, their planners, their method-study analysts, but "we, too, can and must be experts in foremanship—in the final executive control of operation on the shop floor. Then and only then, shall we play our full part in industry, and people be convinced that foremanship is not in decline." During the dinner presentations were made to two retired foremen—Mr. W. D. Craddock (55 years) and Mr. J. Wheater (45 years).

Parliamentary

Clean Air Act—Date and Other Queries

In order that the operation of the Clean Air Act might be debated in the House, Dr. Edith Summerskill (Lab.) moved that the Act be annulled. She expressed concern that under Section 1 (3), which gives possible grounds for an offence under the Act, as she thought industrialists might take advantage of the section. Had there been research into smokeless fuels and the firing of furnaces and locomotives; were some local authorities and industrialists "dragging their feet" in taking advantage of help offered by the National Industrial Fuel-efficiency Service? she asked. Had local authorities investigated industrial premises and given advice and had radio and television been used to educate the public?

How many smoke-controlled areas had been established? Dr. Summerskill asked. What area of the country did they cover and what smokeless fuel was available, and, finally, she asked whether there were enough inspectors available to see that the provisions of the Act were operated.

The Minister's "platform" for replying was almost stolen by Mr. Gerald Nabarro (Con.) who said that although it would be years before air pollution was remedied, a good start had been made; abundant smokeless fuels would be available for the domestic consumer. Industry was responsible for 50 per cent. of pollution and, during the 18 months since the main Statute was passed, it had been re-equipping itself in an effort to achieve smokelessness, and he did not think there would be an undue number of local authority prosecutions involving industrial chimneys after June 1. The Beaver report referred to 300,000 acres of black areas and only 13,000 acres or about 4½ or 5 per cent. had so far been covered by smoke-control areas.

Mr. Arthur Blenkinsop (Lab.) said that Newcastle-upon-Tyne wanted to know more about the adequacy of the inspectorate and whether there would be enough apparatus for measuring pollution. The local authority also wanted assurance that industrialists would instal the photo-electric cell or similar warning systems before June 1. People were also concerned about the provisions to prevent the emission of dust and grit.

Mr. Moyle wanted to know when the powers under the Alkali Act were to be extended to embrace additional industries such as iron works and lime works. Halesowen Council wanted to know what the duties of inspectors would be having regard to the fact that those industries which emitted grit and dust and caused air pollution by their processes were brought within the scope of the Alkali Inspectorate. Foundries could be taken as an example. All foundries emitted grit and dust from their furnaces, grit and dust that also affected foundry workers. How would the foundries be affected on and after June 1, he asked. Who would be responsible for inspecting and reporting the grit and dust that was emitted from their furnaces? Would they be local public health officers, the Factory Inspectorate, or the Alkali Inspectorate?

Local authorities in districts where there was heavy pollution, in particular from the metallurgical industries, were worried what was going to happen if the provisions of the Order became applicable from June 1, said Mr. Richard Winterbottom. At present no one knew what was going to happen in the metallurgical industries which, up to now, had not been affected by any provisions at all, and had been exempt from the Public Health Acts since the middle of last century. He represented a Sheffield constituency where there was quite a number of iron foundries and steelworks, the management of which would be wondering who was to control the emission of dark smoke. Local authority inspectors found themselves in a dilemma because they did not know whether they would be given the right to control dark smoke.

Complaints about difficulty in getting smokeless fuel were supported by Mr. Denis Howell (Lab.) who also wondered what was going to happen about air pollution from such sources as railway yards.

Ministry Reply

Replying to the debate, Mr. J. R. Bevins, Parliamentary Secretary to the Ministry of Housing and Local Government, said that the majority of local authorities had been conscientious and assiduous in seeing that the provisions requiring that new furnaces should be smokeless, fixing the height of chimneys, making smoke-controlled areas and preventing the emissions of smoke from colliery spoil heaps, etc., would be carried out.

He thought that proper notice was being given to industry to comply with the Regulations and pointed out that there were exemptions which enabled operations like fire cleaning and sootblowing, to be carried out. There was a certain amount of latitude allowed to some industries but it would be allowed for only a limited period and it was essential in the interests of efficiency that it would be allowed.

Mr. Bevins announced that an Alkali Works Order was in draft and was expected to come into force on June 1. The position in Sheffield was not an easy one. It was true that representations had been made to the effect that the Minister might consider making an order under the Clean Air Act. On the other hand it had been represented by the British Iron and Steel Federation, and by the employers' organizations, that certain processes—not all—in the iron and steel industry should be scheduled under the alkali legislation. If, at a later date, Sheffield wished to make representations to secure its own point of view, they would be considered.

So far the Minister had confirmed ten Orders for smoke-control areas, covering about 11,000 acres and nearly 7,500 buildings. In addition three Orders for smokeless zones under local Acts were confirmed last year. This was only a modest start, but 16 further Orders involving about 1,200 acres had been submitted for confirmation and another 51 proposals covering about 61,000 buildings had been provisionally notified; none of those schemes was likely to be held up because of difficulty in procuring smokeless fuel.

The position with regard to inspectors was by no means ideal but it was a good deal easier than it was a year ago. The Minister was considering the desirability of making Regulations covering the apparatus to be installed by factories to check whether their smoke was dark smoke or not.

Recent Wills

BRADSHAW, R. G., of Retford (Notts), ironfounder ...	£97,193
BARNINGHAM, M. R., managing director of Guest, Keen & Nettlefolds in Pakistan, Limited	£26,254
WOOD, A. F., late a director of the Ransome & Marles Bearing Company, Limited, Newark (Notts) ...	£89,664
WOOLASS, STANLEY, deputy chairman of C. & J. Hampton, Limited, toolmakers and ironfounders, of Sheffield	£41,796
BROWNHILL, R. L., financial director of Beans Industries, Limited, engineers, ironfounders, etc., of Tipton (Staffs)	£38,924
ADDY, J. W., former director of John Addy & Son, Limited, precision engineers and ironfounders, of Clayton West, near Huddersfield	£4,144

Company News

HENRY NORRINGTON & SON, LIMITED, agricultural engineers and ironfounders, of Exeter—The company is cutting its dividend by 2½ per cent. to 12½ per cent. for the year to September 30 last. Group net trading profit has fallen to £14,538 from £20,957 after all charges except taxation of £8,065 (£11,380).

ENGLISH ELECTRIC COMPANY, LIMITED—Group profits, after increased depreciation of £2,775,985 (£2,291,417), amounted to £6,916,989 for the year to December 28, 1957, compared with £6,735,195 for 1956. The profit balance attributable to the company is £2,951,285 (£2,911,812) and the dividend is maintained at 14 per cent. on the increased capital of £18,266,065 with an unchanged 10 per cent. final.

E. H. BENTALL & COMPANY, LIMITED, agricultural engineers and ironfounders, of Maldon (Essex)—Due to inflation and considerably increased turnover, the board has not found it possible to keep group borrowing within the £146,230 limit set up in 1948. To avoid restricting operation and expansion, it is proposed to increase the limit to an amount equal to paid-up share capital. On that basis the new limit would be £296,230.

NEWTON, CHAMBERS & COMPANY, LIMITED—The final dividend is being raised from 9 per cent. to 10 per cent., making 16 (15) per cent. for 1957. Profits, subject to audit, are £858,907 (£753,349). Deducting tax of £479,400 (£420,863), less £29,000 over-provided, there is a net profit of £379,507 (£361,486). A sum of £37,616 (£36,148) goes to employees' profit share bonus, £50,000 (nil) to supplementary staff pensions, and £100,000 (£150,000) to general reserve.

COLTNESS IRON COMPANY, LIMITED, cement and brick manufacturers, of Glasgow—Group trading profit increased from £145,839 to £179,109 in the year to September 30, 1957. After taxation of £106,975, against £87,745, the net balance is up from £58,094 to £72,134. A final dividend of 6d. per 6s. 8d. share is recommended, making 1s. per share, or 15 per cent. on the £525,002 one-class capital. For the previous year a single payment of 15 per cent. was made.

WESTWOOD, DAWES & COMPANY, LIMITED, mechanical and structural engineers, etc., of Stourbridge (Worcs)—CIC consent is to be sought for the capitalization of £25,000 of reserves in a one-for-four scrip issue. Profits rose from £54,691 to £70,558 and the distribution is increased by adding a 2½ per cent. bonus to the maintained 20 per cent. dividend. The profit is struck before charging tax of £38,638 (£30,342). It is proposed to double the authorized capital.

HILGER & WATTS, LIMITED, scientific instrument manufacturers, of London, S.E.5—The company is raising its final dividend from 7 per cent. to 10 per cent., to make 13 per cent. on the £300,000 ordinary for the year ended September 30, 1957. The previous year's total was 10 per cent., of which the 3 per cent. interim was paid on £225,000. The dividend takes £22,425 (£15,956). After depreciation of £45,283 (£41,673), the group profit of £181,062 compares with £123,479. Tax absorbs £93,372 (£71,897), leaving a net profit of £87,690, against £51,582.

VULCAN FOUNDRY, LIMITED—The company is not paying an ordinary dividend for the year to December 28 last, against 10 per cent. in the previous year. After all charges other than tax there is a group loss of £286,497, compared with a profit of £139,469. Subvention payments of £335,000 from the English Electric Company, Limited, the parent company, cover losses for the year. Group profit after all charges, and crediting subvention payments, is £26,503 (£44,807).

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

786,229. Friedrich Nielsen, 18, Füchtenweg, Muhlacker, Wurttemberg, Germany.

A method of introducing additives into molten metals by means of pouring gates. These are so constructed as to produce a suction effect in the zone of introduction. The additive is placed in the gate, and when the molten metal flows through it melts the additive, drives it into the receiving vessel. The cross section of the pouring gate is in accordance with the formulæ:

$$\text{Cross section} = \frac{\text{constant}}{\text{height of fall}}\, n$$

where "n" is equal to, or greater than 0.5 above the point of introduction of the additive, and is equal to or less than 0.5 below this point.

786,248. Gebr. Buhler, Uzwil, Switzerland.

Improvement in die-casting injection moulding and other pressure machines, which require relatively movable elements to be locked together, so as to counteract pressures tending to force these elements apart.

786,333/4. Siegfried Junghans, Schorndorf, Wurttemberg, Germany, and D. R. Martin, 10, Lincoln's Inn Fields, London, W.C.2.

Improvements in, or relating to, processes and apparatus for continuous casting.

786,836. Kensington Steel Company, 505 Kensington Avenue, Chicago, 28, Illinois, USA.

One-piece castings of link units used for vehicle endless tracks, such as those used on earth-moving equipment.

786,993. Mannesmann A.G., Mannesmannufer 1b, Düsseldorf, Germany.

Low-alloy steels which have good mechanical properties, but whose castability is unimpaired by too high a nitrogen content. A typical alloy might have the following composition: C 0.12 to 0.25, Si 0.25 to 0.5, Mn 0.5 to 1.8, Va 0.05 to 0.2, N 0.015 to 0.025, and Al 0.030 to 0.07 per cent. The remainder is iron.

Changes of Names

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

SPARK ALLOYS, LIMITED, Vale Road, Tonbridge, Kent (Spark Holdings, Limited).

RICHARD E. DUPONT, LIMITED, 56, Kingsway, London, W.C.2 (Modern Pipes & Fittings, Limited).

CHARLES COOPER (TIPTON), LIMITED, Locarno Road, Tipton, Staffs (Firth Cleveland Steel Strip, Limited).

RIGIDIZED METAL COMPANY, LIMITED, Church Street, Warrington, Lancs (Lockers (Pressings), Limited).

STRESS CONSULTANTS & ENGINEERS, LIMITED, 93, Regent Street, London, W.1 (P. B. Lindsey & Company, Limited).

STEELE & COWLISHER (HANLEY), LIMITED, engineers, etc., of Cooper Street, Hanley, Stoke-on-Trent (Appleyard of Leeds, Limited).

H. W. WARD & COMPANY, LIMITED, machine-tool makers, etc., of Dale Road, Selly Oak, Birmingham, 29 (Edward Williams Holdings, Limited).

RAINE & COMPANY, LIMITED, iron and steel manufacturers, etc., of Grainger House, Blackett Street, Newcastle-upon-Tyne (Sinjul (Holdings), Limited).

MOBILE WELDERS, LIMITED, 35/41, Lower Marsh, London, S.E.1 (Truscon Precast, Limited).

Forthcoming Events

MARCH 3

Institute of British Foundrymen

Sheffield and district branch:—"Foundry Sands," by W. B. Parkes, 7 p.m., at the Sheffield College of Commerce and Technology, Department of Engineering, Pond Street.
Lancashire branch:—"Malleable Cast Iron," by J. D. Leishman, 7 p.m., at the Midland Hotel, Manchester.

MARCH 4

Incorporated Plant Engineers

"Plant Engineers in a Changing Britain," by L. G. Northcroft, O.B.E., B.Sc.(Eng.), 7 p.m., at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

Institute of Metals

Oxford local section:—"Nucleation and the Cast Structure," by V. Kondic, B.Sc., Ph.D., 7 p.m., at the Cadena Café, Cornmarket Street.
South Wales local section:—"Metals for High-temperature Service," by W. Betteridge, B.Sc., Ph.D., 6.30 p.m., at the Department of Metallurgy, University College, Singleton Park, Swansea.

Association of Bronze & Brass Founders

Lancashire and Cheshire area:—Report and discussion of the current activities of the Association, 11.45 a.m., following luncheon, discussion of the "Survey of Furnaces for Melting Copper Alloys, with Cost Data compiled under Production Conditions in Sand Foundries" (Mr. E. C. Mantle will be in attendance). The meeting will be held at the Midland Hotel, Manchester.

MARCH 5

Incorporated Plant Engineers

Leicester branch:—"Electrostatic Filters," by M. Penrose, 7 p.m., at the Bell Hotel.

Institution of Production Engineers

Edinburgh section:—"Case for Materials Handling," by F. H. Eccersley, 7.30 p.m., at the North British Hotel, Princes Street.

MARCH 6

Institute of British Foundrymen

Stoke-on-Trent section:—"Training of Foundry Apprentices," by H. Haynes, 7.30 p.m., at the Stipendiary Court Room, Town Hall, Hanley.

MARCH 7

Institute of British Foundrymen

London branch:—"Men Only" dinner, reception 7 for 7.30 p.m., at the Duke of York's Headquarters, Kings Road, Chelsea.

MARCH 8

Institute of British Foundrymen

East Midlands branch:—"Carburization of Molten Cast Iron," by P. J. Moseley and J. Lister, 6 p.m., at the Gas Showrooms, Nottingham.
Newcastle and district branch:—Works visit to Victor Products (Wallsend), Limited. (Details from secretary.)
Scottish branch:—"Marine Propellers and other Large Bronze Castings," by A. L. Wakeling, 3 p.m., at the Royal Technical College, George Street, Glasgow.

Increases in Capital

ROBINSON, SHORTHOUSE (ENGINEERS), LIMITED, Wordsley, Stourbridge, Worcs (Henry Robinson (Fibres), Limited).
MECHANICAL & ELECTRONIC PRODUCTS (LONDON), LIMITED, 2, Parton Street, London, W.C.1 (S.E. Laboratories, Limited).
ALDERSGATE TRADING COMPANY, LIMITED, 183, Willesden Lane, London, N.W.6 (Aldersgate Engineering Company, Limited).
MONITOR BRAKE COMPANY, LIMITED, Warne-Wright House, Keeley Street, Birmingham, 9 (Witton Engineering Company, Limited).
P. HODGES & COMPANY, LIMITED, engineers, etc., of Standard Machine Works, Wells Road, Nottingham (Purdy-Hodges, Limited).
AUTOMOTIVE REMOTE CONTROLS (STOKE-ON-TRENT), LIMITED, Albany Mill, Canal Street, Congleton, Ches (Cold Storage (Heywood), Limited).
R. A. LYCETT (AGRICULTURAL ENGINEERS), LIMITED, Main Road, Wigginton, near Tamworth, Staffs (R. A. Lycett (Constructional Engineers), Limited).

INVESTRIL CENTRIFUGAL CASTING

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INSTRUCTION IN INVESTRIL

Centrifugal casting is obtainable at the following Technical Colleges :—

The Borough Polytechnic, Borough Road, London, S.E.1

The Central School of Arts & Crafts, Southampton Row, London, W.C.1

The School for Jewellers & Silversmithing, Vittoria Street, Birmingham 18

The Mid-Warwickshire School of Art, 1 Beauchamp Hill, Leamington Spa.

The Leicester College of Art, The Newarke, Leicester.

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Personal

Mr. S. G. MEDCRAFT, formerly London sales representative of Fielding & Platt, Limited, of Gloucester, has now been appointed the company's sales manager.

Ashwell & Nesbit Limited, announce that Mr. R. A. S. LOMAX, A.M.I.MECH.E., who holds the position of works manager, has been appointed a director of the company.

Mr. FRANK WOOD, head of the commercial department at the Constantine Technical College, Middlesbrough, since 1954, has been appointed principal of the Peel Park College of Further Education, Salford.

Mr. H. E. TURNER, home sales and service manager of the Parsons Engineering Company, Limited, Southampton, has retired after 51 years with the company. He joined the company in 1907 as a fitter and was the company's chief engineer from 1917 to 1951, when he was appointed to his last position.

Mr. J. D. PAYNE (Erdington, Birmingham) formerly at the Birmingham College of Art and Crafts has been awarded a bursary value £150 in Domestic Solid-fuel-burning Appliances in the 1957 competition held under the auspices of the Royal Society of Arts. Mr. R. E. N. SANDBERG of Cranbrook, Kent, was commended. He studied at the L.C.C. Central School of Arts and Crafts.

Mr. D. L. NICHOLSON, who has been appointed assistant managing director of Production-Engineering, Limited, London, has relinquished his directorship of William Denny & Bros., Limited, the Dumbarton shipbuilders. Mr. Nicholson, who was appointed to the board of the latter company in 1955, was a member of the team of British experts which went to India in November last year to advise on the site and layout of a new shipyard.

Dr. ASHLEY S. WARD, president of Thos. W. Ward, Limited, Sheffield, was knighted by the Queen at an investiture at Buckingham Palace on February 11. A nephew of the founder of the firm, he joined the company as a young man, and became chairman and managing director in 1941, and the first president of the company in 1950. He was Master Cutler in 1939, and is chairman of the Park Gate Iron and Steel Company, Limited, and vice-chairman of Laycock Engineering Company, Limited.

Associated British Engineering, Limited, have announced that Mr. ALLEN A. SCAIFE, until recently technical head and chief superintendent at Joseph Constantine Steamship Lines, Limited, Middlesbrough, is to succeed Mr. J. F. MACLEOD as managing director of H. Widdop and Company, Limited, diesel-engine builders, Invincible Works, Greengate, Keighley. Mr. MacLeod is retiring as head of the Keighley firm for health reasons, but he will remain on the board of directors.

Obituary

Mr. FRANK BOOTH, who was foundry foreman at Harper Phillips & Company, Limited, Grimsby, for 25 years, died on January 20 at the age of 68. He was a member of the Lincolnshire branch of the Institute of British Foundrymen.

The death has occurred at the age of 57 of Mr. CHARLES S. PETTE, works accountant and office manager of British Titan Products, Limited, titanium pigment manufacturers, of Billingham-on-Tees. He was formerly with Dorman, Long & Company, Limited, Middlesbrough.

The death occurred last Sunday of Mr. CHARLES WILLIAMS, the chairman and managing director of Samuel Smith & Sons, Limited, Beehive Foundry, Smethwick. Mr. Smith was also chairman of Cleveland Rivets & Tools, Limited, of Sutton Coldfield.

Major A. J. THATCHER, who for the past two and a half years has been apprentices' supervisor at the yard of Wm. Doxford & Sons, Limited, the Sunderland shipbuilders, has died at the age of 52. Before joining the Sunderland firm Major Thatcher held a similar position with Richardsons, Westgarth & Company, Limited, Wallsend, for three years.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

CANADA—United Kingdom Trade Commissioner at Toronto has stated that a well-known Canadian subsidiary of a large US firm, who specialize in the sales and servicing of ore dressing, processing, and materials handling equipment, are interested in enlarging their scope in Canada and would like to become associated with suitable United Kingdom manufacturers either on a sales agency or manufacturing under licence arrangements. The Toronto firm would consider representation of any United Kingdom manufacturers of suitable lines, complementary to their own products. These would include such things as:—Crushers (rock and gravel), screening equipment, magnetic separators, rock feeders, rotary driers, grinding media—balls and rods, grinding mill liners—manganese and nihard. (ESB/3025/58.)

USA—Mr. M. P. Jacobs, Purchasing Agent of the Construction Division of the Tennessee Valley Authority, Lupton Building, Chattanooga, Tennessee, has told the British Consulate at Atlanta that he had been experiencing some difficulty in obtaining from U.S. sources cast-steel balls to be used with coal pulverizers for use at their steam plants, and he would like to get in touch with United Kingdom manufacturers who might be in a position to manufacture reliable cast-steel balls for this operation. Mr. Jacobs said that any purchases would be on a trial basis, but that if they proved to be satisfactory good business could result. The following details of the cast-steel balls required have been supplied:—88 of 10¼-in. dia.; 6 of 9⅝-in. dia.; 10 of 9¼-in. dia.; 10 of 8½-in. dia., 6 of 8¼-in. dia. The standard balls shall be 10½-in. dia., plus or minus ¼-in. The balls may be a maximum of ½ in. out of round. (ESB/4280/58.)

BUCKINGHAMSHIRE, March 1—Supply of following for County Council: Iron castings—gully grates, weirs and manhole covers. Documents from the County Surveyor, County Offices, Aylesbury, on receipt of a stamped addressed envelope (foolscap).

HIGH WYCOMBE, BUCKS, March 11—Supply of the following for the 12 months ending March 31, 1959, for Town Council: Manhole covers and frames, gully grates and frames, etc. Documents from the Borough Engineer and Surveyor, Municipal Offices, High Wycombe.

DEWSBURY, YORKS, March 6—Supply of the following for Town Council: Cast-iron pipes and specials; valves and hydrants; surface boxes (cast-iron, etc.), in such quantities as may be required during the year ending March 31, 1959. Documents from the Water Engineer, 10, Church Street, Dewsbury.

TYLDESLEY, LANCS, March 1—Following for period of 12 months from April 1, 1958, for Urban District Council: Cast-iron manhole covers and frames, and gully gratings and frames. Documents from the Engineer and Surveyor, P.O. Box No. 7, Town Hall, Tyldesley.

CAERPHILLY, GLAM, March 1—Following for the year ending March 11, 1959, for Urban District Council: Drainage ironwork. Documents from the Engineer and Surveyor, Council Offices, Caerphilly.

EAST DEVON, March 5—Supply of the following for the year ending March 31, 1959, for the Water Board: Cast-iron surface boxes. Documents from the Engineer to the Board, The Laurels, 46, New Street, Honiton, Devon.

STROUD, GLOS, March 8—Providing and laying at Painswick of approximately 2,600 lin. yd. of 6-in. dia. class D spun-iron pipes, together with the necessary valves and fittings, for Stroud District Water Board. Documents from the Engineer and Manager, 13, Wallbridge, Stroud. Deposit, £3 3s.

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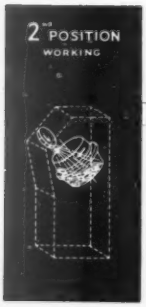

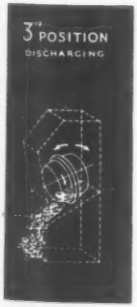

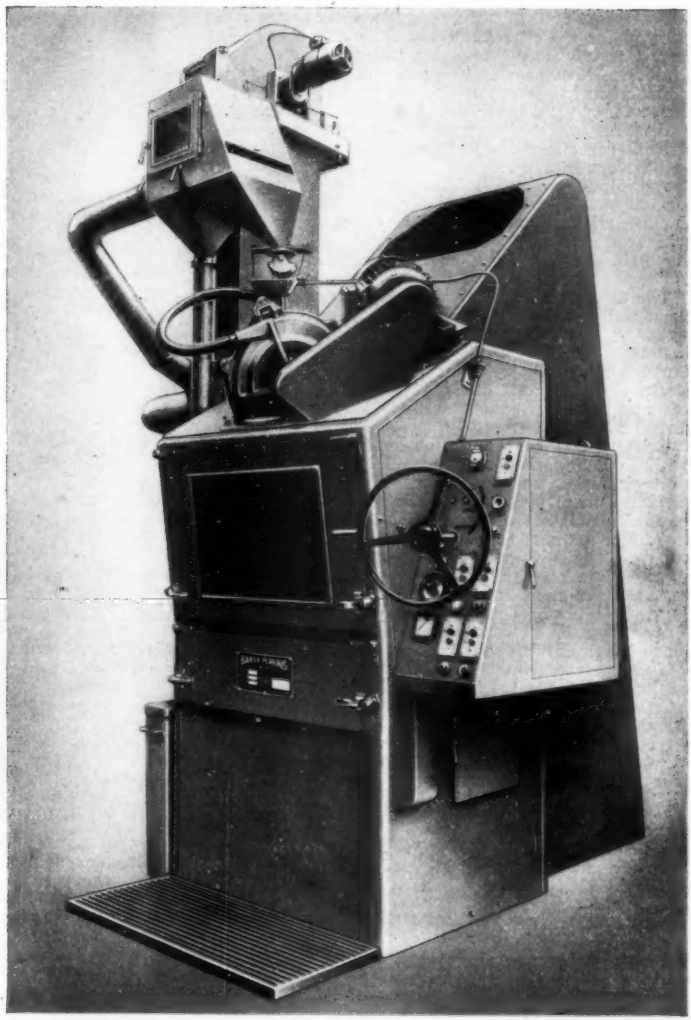

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Raw Material Markets

Iron and Steel

Production of pig-iron is maintained at good levels and in most grades the tonnages available are more than sufficient to cover present needs. The January weekly output of 271,000 tons showed a decrease on the 1957 average weekly rate, and this was due to the reduced demand for both basic and high-phosphorus irons. Most of the blast furnaces are producing basic pig-iron for the steelworks, but the demand is not so heavy as it was and is being met fully from home furnaces. Makers of pig-iron are well provided with ore for both consumption and stock requirements, and deliveries of blast-furnace coke are also satisfactory.

Business at the foundries is little changed. It is difficult for many of them, particularly the light and textile foundries and to a lesser extent the jobbing foundries, to secure the increased business needed to keep plants fully employed. Prospects at present are not too bright, but it is hoped that seasonal influences will bring some improvement shortly in the demand for light castings for domestic equipment, building, and other trades.

The engineering and speciality foundries are in the main well employed. The motor vehicle trades continue to specify appreciable tonnages of high-duty castings, and the heavy engineering and electrical trades with other users, including the collieries and steelworks, are also calling for good quantities of castings. There is some decline in orders from the machine-tool industry.

Consumption of the low-phosphorus irons is at a good level and producers are able to dispose readily of their makes and also of the comparatively small stocks which they hold. Hematite is also in fairly good demand, but many producers need more orders to absorb outputs fully. Refined irons are in good supply. The high-phosphorus pig-irons, with home demands moderate, are plentiful, and makers are able to undertake much more overseas business than for some time past. This enables them to release consignments from stock which would otherwise be at much higher levels.

The contraction in demand for small bars and light sections continues. In the English Midlands many units find it difficult to make up their rolling programmes from day to day, and a number of them are on a four-day working week. Demands for the heavier sizes are on a better scale, and the call for reinforcing bars is fairly good, though not so heavy as it was.

The supply of billets in the normal qualities and sizes continues at a good level, but is in excess of present demands. Stocks of steel semis at the re-rollers are still fairly heavy and this continues to restrict demands. There is little call for arisings at the steelworks of defectives and crops, the present price level being considered much too high compared with that of prime material.

Non-ferrous Metals

Copper is quiet on both sides of the Atlantic, with the US price structure continuing under pressure. Producers are still quoting 25 cents a pound, at which level business is described as modest. Custom smelters are quoting 23½ cents a pound, but selling is believed to be taking place at fractionally lower levels. Copper for export is at 22½ cents a pound and scrap is on offer at 17½ cents a pound, although this market has become very tight. Market sentiment was helped last week by the figures released by the US Copper Institute, which showed that deliveries of refined metal in January amounted to 109,707 tons, which compares with only 84,446 tons in December. At the same time, US production in January remained virtually unchanged from the December level, so that stocks showed a welcome decline. Elsewhere in the Free World deliveries in January were also shown to be above those made in December. Furthermore, stocks decreased, as did the production of refined copper, although the output of crude copper was greater.

Reports from America indicate that business conditions deteriorated in February and there is little optimism concerning the future trend of consumption. In London the market is quiet, with the contango still below £1 a ton. Prices, however, have been fairly steady, which has prompted some bear covering. At the end of last week stocks of refined copper in LME warehouses were 350 tons higher at 19,855 tons.

Tin has been a much better market of late. A sharp upward movement in the Eastern price occurred over last weekend, when the Singapore quotation rose to £732 a ton, equivalent to £760 a ton in London. The price rise in the East is attributed to the sharp fall in stocks following on considerable sales of the metal effected before the start of the Chinese New Year. Moreover with consumer interest better in London, the quotation for both spot and three months' metal is now well above the buffer stock support level. If this consumer interest continues, the full impact of the quota restrictions will soon be felt and the price will rise steadily towards £781 a ton. Stocks of refined tin in LME warehouses at the end of last week totalled 17,406 tons, a rise of 790 tons. In the US the market is quietly steady, with the price moving narrowly between 95 and 96 cents a pound.

In lead the feature has been the cutback in production by St. Joseph of some 6,000 tons of lead a month, which has imparted a much firmer undertone to the market. In fact, the feeling is gaining ground that the lead market has bottomed and that the outlook has definitely improved. This feeling, of course, precludes the possibility of a further slide in the copper price which, if it happens, would drag down the other non-ferrous markets in sympathy. In the US the price remains at 13 cents a pound.

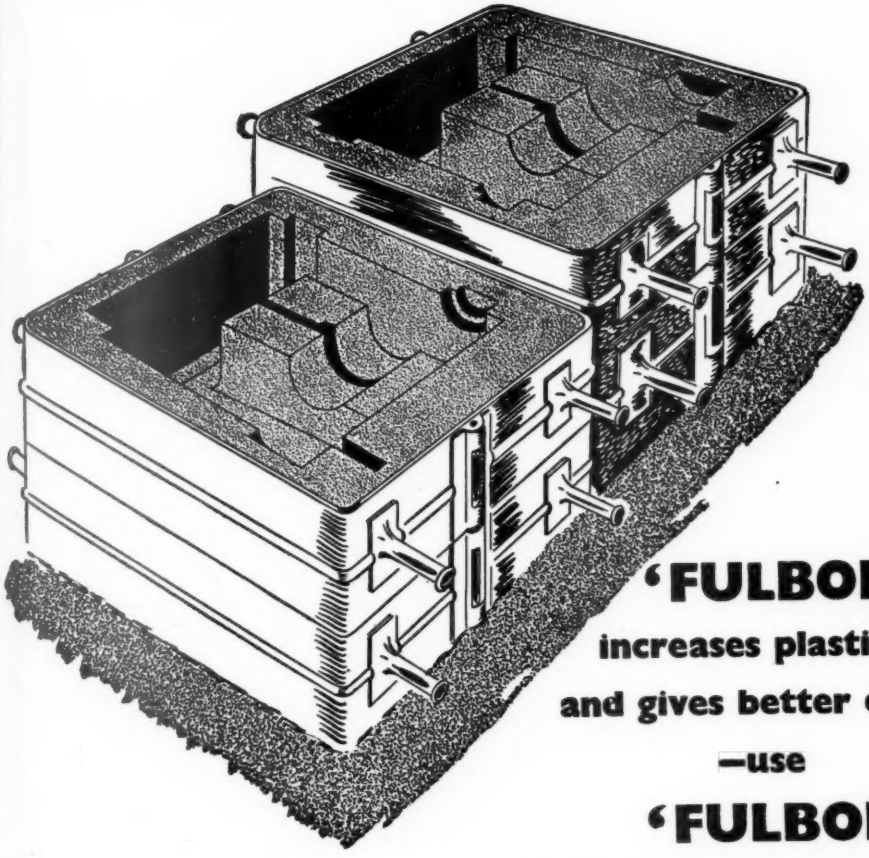
Zinc also benefited by the decision of St. Joseph Lead, as the production cutback involves the loss of some 3,500 tons of zinc a month. Accordingly the undertone in this market has also improved. In the US the price is called 13 cents a pound.

English Electric's Assets

Group assets of the English Electric Company, Limited, expanded from £110,700,000 to £122,200,000 during the year to December 28, 1957. Net current assets are £47,203,549 (£32,768,581) and stocks and work in progress (less payments on account) amount to £48,657,942 (£43,924,515). During 1957 3,044,344 ordinary £1 shares at a premium of 30s. and £9,000,000 5½ per cent. debentures at 97 per cent. were issued. The issued capital is now £20,901,909 (£17,857,565) and loan capital is £17,524,146 £8,930,181).

In the financial year two new wholly-owned subsidiaries were formed. The English Electric Company of Australia Proprietary, Limited, took over the company's existing manufacturing and selling organizations in Australia. The other formation was the English Electric Company of India (Pvt.), Limited, which will manufacture fusegear and associated equipment in its new factory at Madras.

DEEP DRAWS...



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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

February 26, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £48 10s. 0d. to £50 15s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £68 10s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 26s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 8d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 8d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £93 0s. 0d. to £96 10s. 0d., basis 60 per cent. Cr, scale 32s. 0d. per unit; over 6 per cent. C, £91 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 32s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C,* 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 3d. to 7s. 10¼d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 20s. 9d. to 21s. 3d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £87 19s. 3d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £33 1s. 6d.; tested, 0.08 to 0.33 per cent. C, £34 1s. 6d.; hard (0.41 to 0.60 per cent. C), £35 3s. 0d.; silico-manganese, £44 2s. 6d.; free-cutting, £37 5s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 7s. 0d.; silico-manganese, £44 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 18s. 6d.; acid, up to 0.25 per cent. C, £43 10s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 12s. 0d.; boiler plates (N.-E. Coast), £45 2s. 0d.; floor plates (N.-E. Coast), £44 1s. 0d.; angles (N.-E. Coast), £40 6s. 6d.; joists (N.-E. Coast), £40 2s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 8s. 0d. (under 10 tons to 4 tons, £41 5s. 6d.; under 4 tons to 2 tons, £41 10s. 6d.); hoop and strip, coils, £40 10s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £45 16s. 0d.; black sheets (hand mill), 24g., £59 4s. 6d.; galvanized corrugated sheets, 24g., £67 6s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £69 9s. 6d.; nickel-chrome, £100 12s. 6d.; nickel-chrome-molybdenum, £112 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £160 10s. 0d. to £160 15s. 0d.; three months, £161 15s. 0d. to £162 0s. 0d.; settlement, £160 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 7½d. per lb rods, 188s. 0d. per cwt. basis; 20 s.w.g., 221s. 3d. per cwt.

Tin.—Cash, £730 0s. 0d. to £730 10s. 0d.; three months, £732 10s. 0d. to £733 0s. 0d.; settlement, £730 10s. 0d.

Lead (Refined Pig).—Second half February, £74 2s. 6d. to £74 5s. 0d.; second half May, £73 10s. 0d. to £73 15s. 0d.

Zinc.—Second half February, £61 15s. 0d. to £62 0s. 0d.; second half May, £62 5s. 0d. to £62 7s. 6d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £97 15s. 0d.; rolled zinc (boiler plates), all English destinations, £95 10s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £87 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 4½d. per lb.; sheets to 10 w.g., 14€s. 0d. per cwt.; wire, 2s. 1½d.; rolled metal, 146s. 0d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £126; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £164; HTB2 (38 tons), — ; HTB3 (48 tons), — .

Gunmetal.—BS1400, LG2 (85/5/5/5), £152; LG3 (86/7/5/2), £162; G1 (88/10/2/½), £216; (88/10/2/1), £205.

Phosphor Bronze.—BS1400, PB1 (AID released), £230 per ton.

Phosphor Bronze Strip, etc.—Strip, 216s. 9d. per cwt.; wire, 3s. 4½d. per lb.; rods, 2s. 8½d.; tubes, 2s. 8½d.; chill cast bars: solids 2s. 10½d.; cored 2s. 11½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 3¾d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 8½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 7½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £76 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £199; AB2, — .

* Average 68-70 per cent.